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VOLUME XXXIII, 1954

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Bell Telephone MAGAZINE

SPRING 1954

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BEHIND THE SCENES: Service Representatives in a Business Office



VOLUME XXXIII

NUMBER ONE

SPRING 1954

Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.



A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: "Behind the Scenes: Service Representatives in a Business Office." From an original etching executed for this MAGAZINE

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JUDSON S. BRADLEY, *Editor*

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CLEO F. CRAIG, *President*

S. WHITNEY LANDON, *Secretary*

JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

IN THIS ISSUE



A. T. & T. Treasurer: John J. Scanlon

APPOINTED TREASURER of the A. T. & T. Co. on September 1 of last year, JOHN J. SCANLON found himself all at once with a man-size burden of responsibility. For the biggest single piece of financing ever undertaken by private enterprise was just coming to a boil, in the form of an issue of A. T. & T. convertible debentures in the face amount of \$602,543,700. Successful completion of the operation last December represents the high point of Bell System post-war financing, but is only one aspect of the broad story Mr. Scanlon

tells. He joined the Accounting Department of the Bell Telephone Company of Pennsylvania in 1925, and became chief accountant in 1946 and assistant comptroller in 1949. His appointment as assistant treasurer in A. T. & T.'s Earnings Division at the beginning of 1952, and in the Financial Division at the end of that year, preceded his elevation to his present post. In World War II he saw duty in Washington and Germany, attaining the rank of lieutenant colonel. Just before that interlude Mr. Scanlon had served for some months with the War Production Board in Washington, and he spent part of 1951 there with the Defense Production Administration.

LONG A RESIDENT of the Pacific Coast, HERBERT L. DEAL is now acquiring an intimate acquaintance with the Atlantic—or at any

B.S.E.C. Director, listening: Herbert L. Deal



rate that section of it adjacent to Asbury Park, New Jersey, where he is directing the operation of the Bell System Executive Conference. He joined the Pacific Telephone and Telegraph Company as a traffic student at Portland, Oregon, in 1928. After serving in various capacities in the traffic organization in Oregon, he was made traffic results engineer for the Pacific Company in 1942, with Headquarters in San Francisco. In 1944 he returned to Oregon as general traffic manager, and in 1951 he was made Vice President and General Manager of the Northern California and Nevada Area. In June of last year he accepted appointment with the A. T. and T. Co. as assistant vice president in Personnel Relations—which particular appointment carries with it responsibility for directing the B.S.E.C.

V.P., P.R.: Bartlett T. Miller



Speaker: Ralph Bown

SERVICE IN WHAT IS NOW the Mountain States Telephone and Telegraph Company between 1910 and 1923 preceded BARTLETT T. MILLER's move to the New England Telephone and Telegraph Company and service in various New England cities. After becoming general traffic supervisor in Boston, he was appointed Commercial Department division manager for Rhode Island, and then general commercial manager at the company's headquarters. He was elected Vice President in charge of Public Relations in 1944, and in 1945 he became Vice President and General Manager of the New England Company. He moved to New York in 1946, where he became an assistant vice president in the O. & E. Department. The next year he was elected Vice President in charge of Long Lines. He returned to the headquarters organization in 1949, and since 1950 has been Vice President in

(Continued on page 63)



*Signing debentures for the
\$600,000,000 A T & T issue in 1953*

*All who help to render good telephone service assist
in carrying out the Bell System's financial program—
the greatest ever undertaken by private enterprise*

PUBLIC FAITH AND RAISING CAPITAL

JOHN J. SCANLON

Treasurer, A. T. & T. CO.

SINCE 1945 the Bell System has raised more than six billion three hundred million dollars in new capital to finance its nation-wide construction program. This far exceeds the entire capital which had been invested in the System during all its history up to that time. In both physical and financial terms the vast accomplishments of the System in this short period may truly be said to typify American free enterprise at its best.

But impressive as the record may be, there is much construction yet to be done—and this means the financing job is not completed.

Everyone in the Bell System who helps in giving good telephone service aids its financial program. Every telephone operator who responds in a friendly tone, every plant installer who leaves behind a pleased customer, every service representative who satisfies an anxious inquirer—in short, every one of us who does his job well—makes an important contribution to the good will of the public toward

our operations. And good will is an indispensable factor in our financial well-being.

To attract the interest of investors, it is essential that people hold our service in high esteem and like our way of doing business. In this respect we are all salesmen for the System. But there are other factors in gaining investment partners. We must also have a credit standing that is backed by a good record of earnings. And we must have a vigilant and prudent financial policy that assures a sound capital structure for the long pull.

Achievement of our financial objectives is necessarily a broad, System-wide affair. It presents a host of problems and demands a high degree of coördination and understanding. Starting with local estimates of communication needs, it touches almost every part of the telephone job—research and development, manufacture and supply, engineering, and all phases of current operation—by the time specific financing is formulated and actual sales in the investment market are undertaken.



Supervisory employees, many of whom had worked on previous issues, get together for an introductory discussion of the 1953 A T & T offer.

Looking Back

LAST DECEMBER the System completed the latest of its post-war financing operations, the successful sale of \$602,543,700 Twelve Year 3½% Convertible Debentures due in 1965. The passing of this most recent milestone along the Bell System financial path seems a long way from the situation which faced us at the beginning of this post-war era. Suppose we had then been told that in the short space of eight years the System would have to almost double its telephones in service, that it would have to carry forward a ten billion dollar gross construction program, and that to do this it would have to more than double its capital funds! Assuming that we were able to grasp fully the significance

of such an assignment, what would we have listed as our strengths and our weaknesses in undertaking this heavy financial program?

On the plus side, the Bell System entered this period with good credit. Its capital structure on V-J Day consisted of 69 per cent stock equity* and only 31 per cent funded debt—about the ⅓ level of debt that we consider proper for our business—and it had the confidence of its 680,000 stockholders. On the minus side, earnings were not adequate to support direct offers of stock and the security mar-

* The stock equity of a company represents the ownership capital invested in the business consisting of the amount paid in for the stock plus retained earnings. It is the owners' interest in the assets of the company after deducting debt and all other liabilities.

Thus, to meet the huge backed-up demand for telephone service carried over from the war years, when materials and manpower were unavailable for plant extensions, management was faced with three interrelated financial problems: first, raising tremendous sums of new money; second, avoiding the dangers of excessive permanent debt; and, third, obtaining authority from regulatory bodies to increase telephone rates in offset to higher costs.

Advantages of Convertible Offers

As most commonly used, convertible bonds are offered by a company when it desires to give the buyers an option to obtain its stock at a price which is above

Telephone Operators • Installers • Linemen • Pay Station Attendants • Motor Vehicle Mechanics • Nurses Laboratory Technicians Typists • Cashiers and Tellers • Draftsmen • Cable Testers • Staff Assistants Mechanics • Accountants Advisors • Clerks • Cable Stenographers • Foremen Engineers • Nurses Telephone • Installers • Pay Station Attendants • Motor	Housewives • Farmers Stenographers • Salesmen Laborers • Accountants • Librarians • Bakers Engineers • Mistresses Newspaper Writers • Photographers • Draftsmen • Physicians Carpenters • Gasmen Gardeners • Dentists Mechanics	Insurance Companies Churches • Hospitals • Sanatoriums • Schools • Colleges • Universities • Charitable Funds • Foundations Homes • Investment Fiduciaries and Other Philanthropic and Commercial Organizations • etc. • etc. Insurance Companies Churches • Hospitals • Sanatoriums • Schools • Colleges • Universities • Charitable Institutions Home
200 THOUSAND EMPLOYEES	OVER 1 MILLION OTHER PEOPLE	50 THOUSAND TRUSTEES AND ORGANIZATIONS

its current market price. The conversion feature in such cases is offered as an extra attraction in order to obtain a better price for the bonds as well as to set the stage for eventual replacement of the debt by stock at some future date if the business continues to prosper and the market rises.

In contrast, our use of convertibles is definitely aimed at early conversion into equity through setting the option price for obtaining the stock below the current market. Assuming that the market price of the stock holds up, this feature of our issues stimulates early conversions and thus operates to effect a prompt and substantial transition from debt to equity capital.

The convertible bond method of financing offers a number of important advantages. To mention but a few, a bond offer with an attractive convertible feature interests the widest possible range of investors, both individual and institutional. Moreover, such an offer incurs much less risk of failure, should there be a decline in stock prices during the subscription period, inasmuch as the coupon rate and term to maturity of the issue can be fixed to make it attractive to banks, insurance companies, and other institutional investors as a bond without regard to the possible value of the conversion privilege.

Further, our convertible issues supply additional equity capital over a period of time through the conversion premium, thus spreading the benefit of the financing. From the point of view of the investor they offer a two-stage payment plan for acquiring the stock, with the conversion payment as the second installment.

Setting the terms of a convertible offer involves careful study and consultation preparatory to their final establishment by the Board of Directors. Since conversion of the issue into stock is the ultimate

aim, the conversion price must be attractive and must be geared to the longer range outlook. Because it is so closely related to the market, it is usually the last item to be considered by the directors.

Once an issue of convertible debentures has been sold, subsequent conversion into stock depends importantly on the earnings and credit of the business as well as on general market conditions. While many investors, particularly long-time holders of stock, convert at the earliest possible date, more or less without regard to market conditions, experience proves that, in the main, conversions take place in volume only when the market price of the stock is sufficiently above the conversion price of the debentures to make an exchange attractive from a price point of view.

The last financing was the sixth issue of A T & T convertible debentures sold since World War II. Over 90 per cent of the first five issues, totalling two billion dollars, has been converted into stock. This may be considered a most successful conversion record. In the case of two of these issues, the 78 per cent conversion mark was reached within the first 12 months after they became convertible.

Sources of Capital since the War

THE SIX BILLION THREE HUNDRED MILLION DOLLARS in new capital—excluding retained earnings,*—which the Bell System has raised since 1945 to carry forward its construction program has come from the general sources indicated in the adjoining table.

As this table shows, the sale of convertible debentures and their conversion into stock have not only accounted for the largest amount of new capital raised during the

* Earnings retained in the business during 1946-1953 provided an additional four hundred million dollars in capital.

POST-WAR CAPITAL

Life insurance companies, savings banks, and other bond buyers have provided, through the purchase of straight debt issues of Bell System Companies		\$2.3 billion
A T & T share owners and others have provided through the purchase of convertibles		\$2.6 billion
Less amount converted into stock and now included as equity	<u>2.2</u>	<u>0.4</u>
Total debt, or borrowed capital		\$2.7 billion
A T & T share owners, new and old, have provided through acquiring shares issued in debenture conversions (including premiums paid upon conversion)		3.0
Employees, through elections to purchase A T & T shares under our Employees' Stock Plan, have provided		0.5
Investors have provided through purchase of shares of subsidiary companies	<u>0.1</u>	
Total equity, or ownership capital		<u>\$3.6</u>
Total capital raised		
(January 1, 1946—March 15, 1954)		\$6.3 billion

post-war period but they have been the key in obtaining the equity money which has kept our capital structure in reasonable balance. In this connection, we cannot overlook our employee stock purchase plans, which have also been important in providing equity money in a steady stream. The increase in the System's straight debt has come through the sale of 32 separate bond issues by A T & T and 12 of its subsidiaries, all sold under competitive bidding and ranging in size from fifteen to two-hundred million dollars. Altogether, since 1945 Bell System companies have gone to the public 60 times for capital funds.

Provision of Equity Capital

IN TOTAL, investors have provided more than three billion six hundred million dollars in equity capital to the Bell System in the post-war era. To raise such vast amounts of equity money in this period has meant that thousands and thousands of people from all walks of life all over the country have had to make the decision to become investment partners in our business. As is well known, we have had no sales force out selling our stock. On the contrary, for the present widespread interest of investors, we have had to depend upon:—

Our financial reputation and our dividend record.

The quality of our service and the good will created by Bell System employees in their daily jobs.

The continuing favor of our existing share owners, for they are probably our most loyal investment boosters.

The interest and investment advice of banks and brokers throughout the nation.

These, along with earnings, will continue to be vital factors in going forward with our construction plans, because more and more people must become interested in A T & T stock for our financing to succeed. In other words, for the System to do its job properly, A T & T stock must have broad mass appeal and must be able to compete successfully in the investment market—where there are many other attractions. Fortunately, today it stands as a leading investment stock. From a survey made in 1952 by the Brookings Institu-

tion, it would appear that nearly one in every five shareholders of our publicly-owned corporations owns some A T & T shares.

Owners of our Equity Capital

THE A T & T FAMILY of share owners is unique both in size and in its general character. Holders now number more than 1,290,000—over twice as many as own any other company. They live in more than 19,000 communities in the United States and some (not a great many) in foreign countries. Most of them—96 per cent—are individuals and about 200,000 are System employees. Small shareholdings predominate, with almost half our owners holding 10 shares or less. The average holding of all individuals amounts to about 30 shares.

Among the owners are also found some 10,000 philanthropic, financial, and other organizations of varying size which hold the stock for millions of indirect owners and beneficiaries. No organization, however, holds as much as one per cent of the



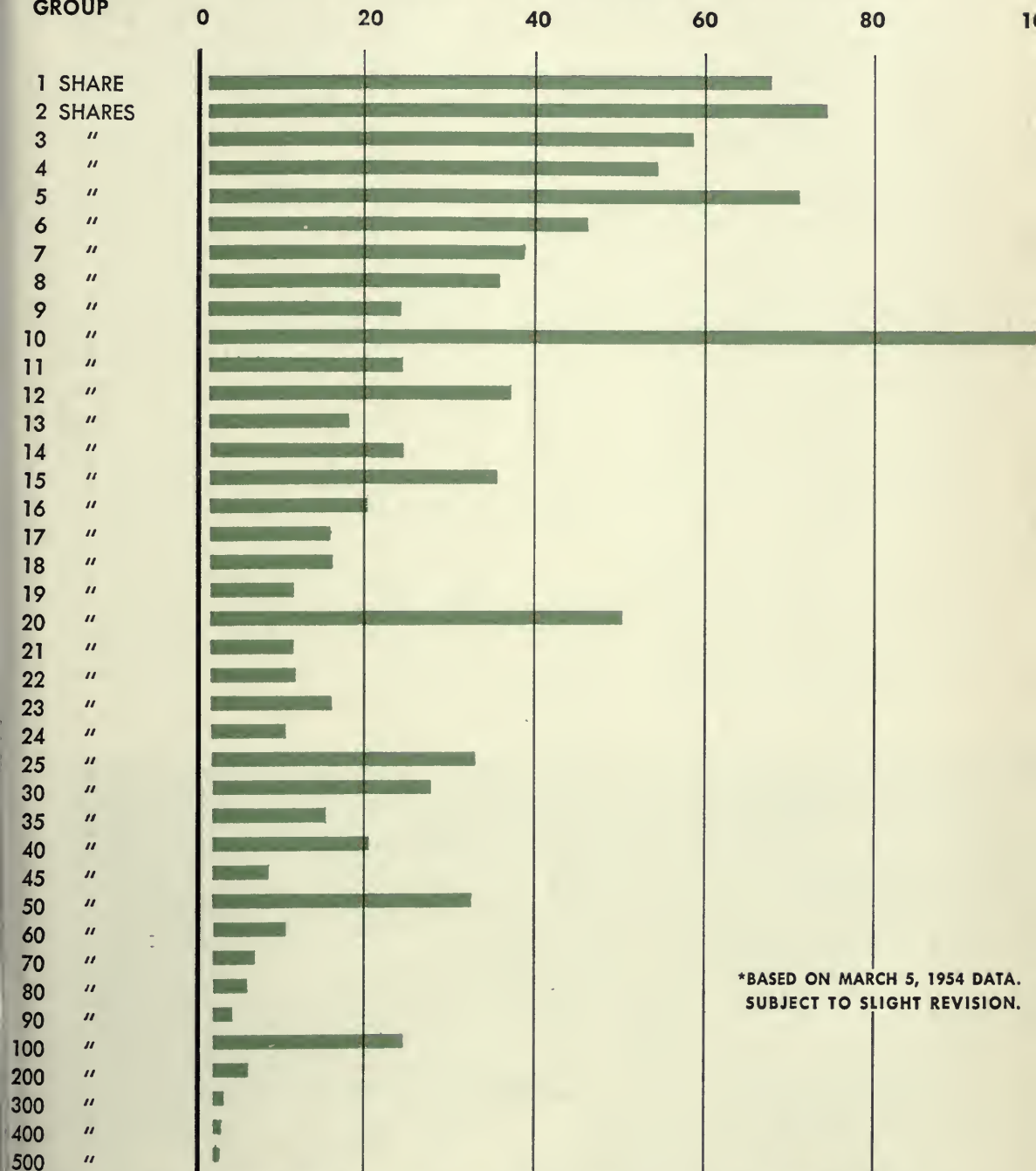
Replies to the 58,000 letters and incomplete subscriptions were made both by telephone and by letter.

SHAREHOLDERS BY SELECTED SHAREHOLDINGS

(as of March 15, 1954)*

SHAREHOLDING
GROUP

NUMBER OF HOLDERS (THOUSANDS)



stock, and the largest holding of an individual is less than one-fortieth of one per cent.

Joint shareholdings, of which there are about 340,000 on the books, representing largely ownership by husbands and wives, are increasingly popular. And most holders show intent of being long-time investors; for of those who owned A T & T shares ten years ago, more than half still own shares today. There are constant losses in the stock list, however, because of those who sell or transfer their shares to others. And we find, unfortunately, that death alone takes more than 500 per week. Because of account closures, during the period since 1945 in which our owners have almost doubled in number, the addition of two new owners has been required, on the average, for a net gain of one.

The very size of our share-owner family presents some interesting and rather exacting administrative problems. As a small example, the multiplicity of duplicate

names, many of which are identical even as to given names, can cause trouble at times. One would expect to find many Smiths, of whom there happen to be 11,200 among our holders; but there also happen to be 7,200 Davises and 6,200 Johnsons, with the Browns a close fourth at 6,100. As for the less prevalent names, there are even 110 Jewetts, 175 Nixons, and 103 Beatties.

Minority portions of the stock of four A T & T subsidiaries (New England, Illinois Bell, Mountain States, and Pacific Companies) are owned by the public. Many of these shareholders, who total about 40,000 in all, also own A T & T stock, and they live for the most part in the operating areas of the subsidiary companies in which they own stock. While their total holdings are relatively small, their subscriptions to new stock offers of these companies in the postwar period have added about \$75,000,000 to the System's equity capital.



In five weeks 20,000 telephone inquiries about the offer were answered by a group of twenty people.

The 1953 Convertible Debenture Offer

THE A T & T OFFERING OF \$602,543,700 Twelve Year 3 $\frac{3}{4}$ % Convertibles last Fall set a new record in several respects. It was the largest issue in corporate history, and it was offered for subscription at par to a record total of 1,258,000 A T & T share owners in the proportion of \$100 of debentures for each 7 shares held.* Because of its unprecedented size, it was a source of great interest both within and outside our Bell System family.

Subscriptions were received for 99 per cent of the issue, exceeding the percentage achieved in any similar A T & T offer in the post-war period. Rights to subscribe, which share owners received and which they could use or sell as they chose, were in active demand throughout the subscription period at prices of \$2.25 or more. Under these conditions, the entire issue would have been taken up through rights before they expired—except for the failure of some holders to take advantage of them. When the rights did expire, at the close of the subscription period, they became void and lost their value.

The conversion price was set at \$136 per share, payable by surrender of \$100 of debentures and remittance of \$36 in cash for each share, with February 9, 1954, as the first conversion date. The offer was thus designed eventually to bring in nearly \$820 million in new capital, if fully converted. Complete conversion of all convertibles now outstanding would reduce

the debt ratio to the one-third level that we consider proper for our business.

In accord with customary practice, the debentures subscribed for were issued to purchasers in bearer form without the names of the owners on them. For this reason, and because we received a great many group subscriptions by banks and brokers for their customers, we have no record of the actual number of individuals who purchased them. We do know, however, that more than 410,000 subscriptions were received. This represented a gratifying ratio of subscriptions to share owners, particularly in view of the fact that it was the sixth such offer within eight years for a grand total of two billion six hundred million dollars.

The Debenture Operation

SOME OF THE PROBLEMS involved in handling this record issue were novel, but the Treasury Department's experience in dealing with so many similar offers helped materially in their solution. Naturally, the limited personnel of the Department could not handle this big undertaking without some help from other Bell System organizations, and this was offered in generous proportions. Essential assistance was provided by our Comptroller's and General Service Departments, both in advice and in personnel, and many supervisory people were loaned to us from the Associated Companies. This not only had the effect of helping out at a time of need, but it also gave a group of 85 Bell System supervisory people outside the Treasury Department the experience of participating in this fund-raising operation.

The Company has recently acquired and remodeled a building in downtown New York, formerly used as a post office and across the street from the spot where Peter

* In an offering of this kind each share owner receives a subscription warrant, specifying his subscription rights, one right being given to him for each share held. He can, of course, use these rights in subscription or sell them. In the 1953 offer, since the ratio was 1 to 7, a subscriber for the debentures needed 7 rights for each \$100 of debentures he desired to buy. Holders of less than the number of rights needed for their subscriptions could buy them from sellers in the market.



Almost 100 of these desks are needed to house the stock ownership record of our 1,290,000 share holders.

Minuet is said to have bought Manhattan Island from the Indians. This building was purchased to house the Company's stockholder records and its securities service force in New York, but prior to its occupancy for this purpose it provided 120,000 square feet of space for the 1953 debenture operation. Over 1,000 temporary employees were engaged for this work, which involved an immense amount of detail and an exacting task for supervisory people.

One of the constant aims in planning for a job of this kind is to give the share owners the best possible service to protect their interest. It would be ideal if every owner became fully aware of the offer and used his allotted rights either in subscription or in sale. To this end, the design of the subscription warrant was further improved to provide on its face for all the instructions which the holder needed to give the Company about its use, and the services of Bankers Trust Company, New York, were offered again to facilitate the purchase and sale of rights by share owners.

For those subscribers who wished to obtain their stock as soon as possible, arrangements were made to hold their debentures, upon request, until the first conversion date: February 9, 1954. Some 113,000 subscribers took advantage of this arrangement and requested over \$70,000,000 of debentures to be held for conversion on the initial date. In so doing they saved themselves the expense of returning the debentures safely to us and we did not have the cost of delivery to them.

As would be expected in our business, the telephone was used freely in communicating with the owners. In addition, every stockholder still on the books who had not used rights in the preceding offer received a special follow-up letter calling attention to the current one. These personal efforts resulted in the largest percentage of use of rights in any of the post-war offers, but it seems impossible to reach the 100 per cent mark in this respect. The Company regrets very much that there had to be any lapsed rights.

Public Faith and Raising Capital

The Task Ahead

THROUGH MARCH 15, over \$300,000,000 of this latest debenture issue had been converted into stock, which exceeds the best conversion record set by any previous issue for a similar period. Full conversion would increase A T & T capital by about 6,000,000 shares. To maintain the average shareholding of our owners at present levels with this additional stock outstanding would involve increasing our stock list by almost 170,000 holders.

With this challenge ahead, it might be well to remind ourselves of the time-tested principles upon which our business has been founded.

Since its beginning, over 78 years ago, the Bell System has been a stockholder institution, financed upon the basic concept that debt should be a controlled and lesser source of capital. Our management has

frequently declared that we must continue in this direction. It has also declared that we must adjust the rate structure until such time as our services are adequately repriced and our industry protected by better earnings. In the meanwhile, we shall continue, I am sure, to improve our techniques as we have in the past and to grow with the country we live in, so that we may fulfill our responsibility for carrying on as a private enterprise this essential national service.

To gain share owners on the scale required to accomplish this purpose means that the Bell System must maintain the favor of investors with a good level of earnings and a thoroughly sound financial structure. It also means that we, as Bell System employees, must continue our utmost efforts to give a standard of service that meets with warm public approval.

On the opening day for converting more than 3,000 people brought their debentures in person to 195 Broadway for conversion into stock.





BACK TO SCHOOL GO BELL SYSTEM EXECUTIVES

HERBERT L. DEAL

Assistant Vice President, PERSONNEL RELATIONS, A. T. & T. CO.;
Director, BELL SYSTEM EXECUTIVE CONFERENCE

GUESTS on their way to breakfast at the Berkeley-Carteret Hotel in Asbury Park, N. J., are becoming accustomed to seeing groups of Bell System men—department heads, and their coördinates in staff, Western Electric, and Bell Laboratories assignments—hurrying with books and papers to four small conference rooms located in various parts of the hotel. Brief news articles have appeared in Asbury Park and Newark newspapers as well as one of the

weekly news magazines about a continuous Bell System training conference for executives; but apparently these notices have raised curiosity without being very informative. For one of the questions frequently encountered, from outsiders and Bell System people alike, is "What's really going on at Asbury Park?"

It's a little difficult to answer this question briefly. So here, instead, is a description.

What Goes On Here?

GROUPS of forty department heads and assistant vice presidents from the various Bell System companies are spending four weeks each in a new type of conference—which has been named the “Bell System Executive Conference.” As one group leaves, another group is already on its way by train, plane, and special bus to start the next conference sessions. In four weeks these men will attend twenty-two morning, eleven afternoon, and eight evening sessions. They will study problems in general management, economics, public relations, rates, and finance. They will have the opportunity to listen to and discuss these problems with eighteen authorities drawn from universities and other businesses, as well as about twenty-five Bell System people—including a number of top executives from the Associated Companies and A. T. & T.

The Bell System holds many conferences—which is necessary, of course, for so large and widespread an operation. Such meetings usually last from a day or two to the better part of a week, and involve operating and policy questions. They are generally directed toward the day-to-day operation of the business.

The Bell System Executive Conference has somewhat different and broader objectives. Executive decisions, to be sound, must be made against a background knowledge and understanding of the economic, social, and political forces affecting the American economy. In view of the pressing demands on business men during the war and post-war years, little time has been available to keep up with anything except the most pressing business problems. At the same time, war and inflation have provided new factors and accelerated old trends, making it highly necessary

to keep management abreast of changes in economic and social conditions.

The B.S.E.C. was organized in an effort to meet this need for Bell System management people. The time here is spent in consideration and discussion of problems in the broad fields of economics, social relations, and general management. Specific answers developed in connection with the problems presented to the group are incidental. It is hoped, of course, that the process of thinking-through in these fields will make for better solutions to operating problems, but the objective is the development of understanding and perspective, rather than specific operating solutions.

Advanced management training has been carried on for some time by some of the universities. People from Bell System companies have participated in these courses and have found them of great value, but the total number of Bell System people who could be accommodated at any one time is small. These schools desire the widest possible business representation, and often have many more applicants than can be accepted. One or two Bell System people per year in the training courses conducted by a half-dozen of the universities is all that can be hoped for. If we want to do more than this, and give a large number of Bell System executives a chance to study our changing environment, there seems to be only one answer: *do it ourselves*.

Problems and Programs

A LITTLE OVER a year ago this problem was turned over to a committee of vice presidents of the Bell System Associated Companies. The committee consisted of:

F. A. Cosgrove, Vice President, Personnel, New England Telephone and Telegraph Company, Chairman;

- J. M. Black, Vice President, Operations, Southwestern Bell Telephone Company;
- R. E. Driver, Vice President and Comptroller, Michigan Bell Telephone Company;
- W. G. Hampton, Vice President, Operations, New York Telephone Company;
- F. G. Macarow, Vice President, Operations, The Chesapeake and Potomac Telephone Company;
- F. M. Malone, Vice President, Personnel, Southern Bell Telephone and Telegraph Company;
- J. N. Stanbery, Vice President, Personnel, Illinois Bell Telephone Company.
- R. K. Greenleaf, Staff Assistant, Personnel, A. T. & T. Co., acted as secretary and worked with the committee.

The members were asked to consider various alternatives and come up with a recommendation as to whether or not the Bell System should try to provide background training for the large number of Bell System executives who could not hope to be included in university training courses presently available. This commit-

tee called on the Operating Companies and discussed the problem with them, and with the deans of several business schools. It was finally decided to recommend that some internal program be instituted.

Last summer a director was appointed and nine staff people were selected from the Associated Companies and the General Departments at 195 Broadway. The staff, composed largely of department-level management people, supplied a cross section of telephone experience.

Gordon Bowden, from the Personnel Relations section of the A. T. & T. Company, had experience with Western Electric and in the Traffic Department of the Pacific Company.

Cy Collins, with a background of both Commercial and Traffic experience, was secured from the O. & E. Department of A. T. & T.

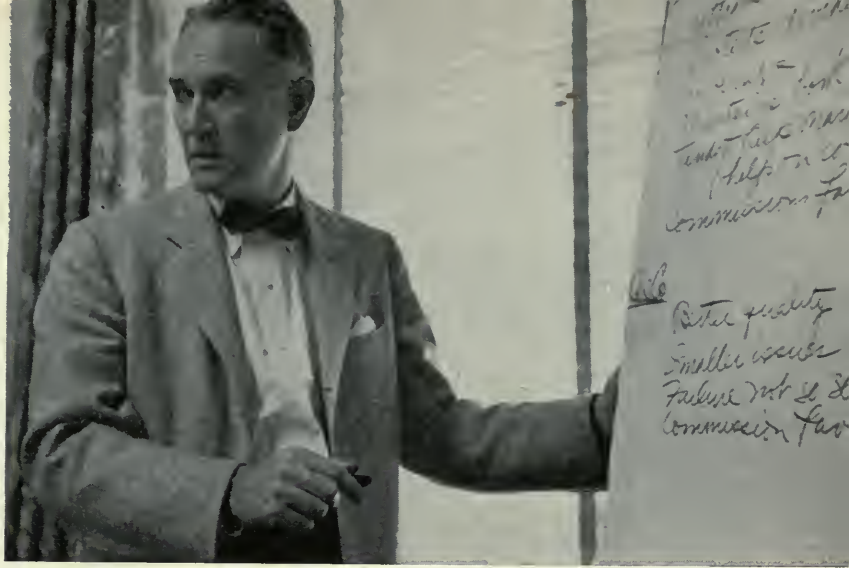
Raymond Foulkrod came from the Michigan Bell, where he was chief engineer.

Robert Ford, with a background of university teaching experience and Bell System experience in the Comptrollers and

Questions are an essential part of the process.



*So is the
summing up.*



Personnel Relations Departments, was secured from the A. T. & T. Company.

Hamilton Loving came from the Long Lines Department, where he had been Accounting Staff Manager.

Fred Marston, with a background of Commercial and Public Relations experience, joined the staff from his job as General Commercial Manager of Indiana Bell.

Robert Myers, from the Plant Department of Illinois Bell, has also had experience in employee attitude studies and rate matters.

Leander Query was secured from the New York Company where he had been Public Relations Manager.

The problem of creating a program was assigned to these staff people, each taking responsibility for one or more sections of the program. Dr. Melvin Anshen, of Carnegie Institute of Technology, Dr. Raymond Bowers, from the Air Force, and Dr. Kenneth Andrews, from the Harvard Business School, acting as consultants, also worked with the staff in the preparation of the program.

As a first step, members of the staff visited the Associated Companies and interviewed over a hundred vice presidents, general managers, and department heads in an effort to determine what was needed to make a program of this type successful and what subjects should be included.

As designed, the course is based upon three main elements: case study and background reading; small group discussion and case analysis; and lectures and discussion with recognized authorities in the several fields covered.

Cases, Discussion, Analysis

THE CASES USED are written presentations of actual business problems. Many are drawn from outside industries; others are prepared to present some of the important problems within the telephone business, such as inflation, finance, personnel and public relations. A good case, studied in advance of a small group meeting, invariably generates a lively discussion of the many problems and fundamental issues involved. Every member participates in the "free-wheeling" discussion, calling upon his own experiences and knowledge. Seldom does a completely unanimous solution emerge—but solutions are not considered of primary importance. As one member of the committee described the process, the sum total of knowledge that comes out of a small group meeting is no more than the total that goes in—but an immense redistribution of that knowledge may take place, to the benefit of each man.



Talking and listening go together.

During a conference session, many hours are provided for reading, and books and pamphlets in considerable variety are furnished. They are selected to provide background information in the respective study and discussion areas. Lectures are given by leading business men, educators, bankers, and others, who discuss problems in economics, finance, labor, politics and utility regulation. The views presented by the speakers are sometimes quite different from the views generally accepted, but it is considered just as important to understand the other person's point of view as the reason for your own. All speakers are available for questions, and



the informal question-and-answer sessions often last longer than the formal talks themselves.

Last November 6th, the first group of department-level people arrived at Asbury Park for a trial run of the program. The first course took three weeks. It was

Outside speakers present fresh viewpoints.





Every member of the conference has the privilege of the floor.

found, however, that the amount of material would lend itself much better to a four-week program, and this has been followed in subsequent sessions.

Over 140 men have already completed the program as this is written, and by the end of June some 300 will have been members of the conference. Each session finds a representative cross-section of Bell System department heads from all Companies in attendance. In addition to department heads and assistant vice presidents of the Associated Companies, the groups include representation of the A. T. & T. Company General Departments; distribution managers, assistant works managers, and other Western Electric executives; and directors of research and development from the Bell Telephone Laboratories. Men to attend the conference are selected by the Companies on any basis which best meets their individual work and service demands. Only department heads or equivalent supervisors

are being included initially, because of conference capacity limitations.

If the conference continues its present four-week schedule, adjourning only during the months of July and August, it is expected that this level of management can be pretty well covered by June 1955. Each session of the conference has all departments represented. This happens without any special attention to the Companies' selection—except that if a Company is sending more than one man, it is requested not to send two men from any one department, so that the conference group will have as wide a departmental representation as possible.

On a typical morning, ten men assemble in each of four small conference rooms at 9:00 a.m. to consider a problem in one of the subjects covered in the course. At least two hours are provided for discussion of this problem. At 11:15 all members of the conference gather in a combined session where a spokesman from



Informal discussion isn't confined to stated hours.

each of the small groups makes a brief report of his group's discussion. The rest of the period to 12:30 is spent in a discussion of the conclusions of the various groups, the principles involved in the problem, and possible solutions.

This joint conference is generally moderated by a vice president of one of the Associated Companies whose job requires special knowledge of the type of problem under discussion. Operating vice presidents and general managers are generally asked to handle joint group discussions in the general management field; Personnel vice presidents in the field of management development, selection, and training. Similarly, Public Relations people and representatives of the Comptroller's and Treasurer's organization handle joint group discussions on problems dealing with public relations, finance, and economics. Some joint group discussions of economic subjects are moderated by a staff consultant who has specialized in the subject. On other occasions, representatives from outside industry become active participants. Contributions to the conference have been made by men from General Motors, Du Pont, Sears-Roebuck, and Esso Export, among others.

After lunch the conference usually reconvenes for a two-hour lecture and dis-

cussion with some outside speaker on one of the fields of study, such as economics, labor, regulation, or other business problems. On days when no afternoon speaker is scheduled, a late afternoon conference session is scheduled from 4:30-6:00, followed by a reception and dinner. These late afternoon sessions are generally reserved for presidents of the Bell System companies and vice presidents of the A. T. & T. Company. Altogether, about forty-two Bell System and other people participate in each session of the program.

Each Thursday the reading material and problem cases which will be considered during the following week of the conference are distributed to the conference members. Background reading and case study frequently requires from three to four hours per day, outside of conference discussions. The men are finding that the case discussion method requires extensive preparation and study.

What are the Results?

THERE HAS BEEN some turnover in staff since the conference started last November. Hamilton Loving has gone to Cincinnati as Long Lines General Commercial Manager. Robert Myers has returned to Illinois, and Cy Collins and Robert Ford have returned to their previous assign-

Back to School

ments. Several new men have joined the staff, including:

W. J. Hancock, Assistant Vice President, Southwestern Bell Telephone Company;

L. E. Rast, Georgia Auditor, Southern Bell Telephone and Telegraph Company;

J. E. Clark, Business Office Engineer, A. T. & T. Company;

C. C. McCabe, Assistant Vice President, The Chesapeake and Potomac Telephone Company.

It is too early yet to say with any certainty the extent to which this type of training will be of benefit to the Bell System management. Reports coming in indicate that several of the department heads who have completed the conference course are using some of the material extensively in planning changes in organization, in the handling of personnel problems, and in

improving the continuous Bell System process of on-the-job education in their organizations. All indicate that new fields of thinking and study have been opened by the discussions at the conference.

By the time the four weeks are over, all members have engaged in many hours of reading, study, and discussion, in addition to that conducted in regularly scheduled conference sessions. A member of one of the early sessions of the conference said, as he was climbing on the bus to return to New York, "If anyone gives me a book for Christmas, I'll bury it in the back yard until Spring."

Well, that's not an entirely unknown reaction; but eight out of ten members of the conference feel that the assigned reading doesn't require too much effort. And almost everyone agrees that this effort has been worth while.

A breath of ocean air between sessions.



SERVING A NATION OF HOME TOWNS

BARTLETT T. MILLER

Vice President, PUBLIC RELATIONS, A. T. & T. CO.

THIS IS A BIG COUNTRY, and only a big telephone system can provide it with nationwide service. We have grown because we met the demands and opportunities which faced us. And, of course, we shall grow bigger as the country continues to grow.

Yet there is danger that the sheer size of the Bell System may obscure our dependence on and our deep concern with each community. For every village or town or city, when added to and combined with all the others, may become a statistical unit, and lose its individuality among the hundreds and thousands of units with which the telephone business must deal.

Of some 6,700 cities and towns where we have telephone central offices, only 230 are cities of 50,000 population and more. We are essentially a small-town business. We must beware, then, lest we become so entranced with our big figures, our big organizations, our big problems, that these statistical abstractions obscure the community, with its own individuality and its own people.

For there would be no big figures or organization or problems if there were no individual communities to whose people we sell our wares—our services.

That is where we start.

ABOUT the beginning of the industrial epoch of this nation of ours, the telephone came into being. It found a useful place on Main Street: in the doctor's house, the livery stable, the newspaper office, and, of course, in people's homes. Mostly its use was between neighbor and neighbor. Its growth was slow—but in that era so was the growth of America and its industries.

There were few telephones in the community at first; but as their usefulness and reliability were better known and their numbers increased, they became the principal channel for social visiting, for business errands, and for all the back-and-forth conversations which have their important place in community life. The telephone became, as we all know, one of the most vital segments of the community



organism: its blood stream, one might almost say.

We have come a long way in three-quarters of a century. Telephone, radio, automobile, and airplane have almost literally brought everyone within reach of anyone. The telephone has been in the front rank in this whole era of industrial development.

All this while—from the very beginnings—we have provided a uniquely personal service to the people of this country. Everything we sell is made individually for each customer, and no one else can use it. The physical appearance of the telephone instrument has changed through the years; but each succeeding improvement in all our facilities has been designed to interconnect with all existing plant, and so our industry has followed the evolutionary rather than the revolutionary path of progress. And we remain still the personal instrument of almost all the people for expressing their most intimate, most important thoughts.

WE STARTED IN BUSINESS by installing a telephone in the doctor's house on Main Street so he might be available to his neighbors, and today we are installing telephones in homes on the Main Streets all over this country so that people can keep in touch with their neighbors. That's what the telephone is used for, mostly: neighbors of the same community transacting their serious, their frivolous, their ordinary business. Seventy-five years ago, all calls originated and terminated in the neighborhood. Today, ninety-five out of every hundred calls are conversations within the same community. We're still a country of neighborhood interests.

To serve the community, we make a substantial investment in plant: poles, wire, cable, telephones, central-office equipment. It grows as the town grows. It is a

permanent investment, and we have a real stake in the community's future. We are bound to experience the same ups and downs—the same booms and depressions—as the community. Obviously, our investment will prove profitable only if our corporate life in the community is successful.

We hire local people. Many are boys and girls graduating from high school. We may erect a building of our own. We help support the community through taxes, payrolls, local purchases of supplies. Thus do we contribute to the welfare of the community. Perhaps the community comes to count on these economic factors in maintaining its way of life.

Any way we look at it, we are citizens of the community, and deeply concerned in its progress and well-being. We want to be in business in forward-looking communities, where there are good schools and hospitals and recreational facilities, so that telephone people and their families can enjoy their environment and thrive in it. And because we as employees have a personal stake in these things, we do all we can to promote them and to assist in their development. We become members of clubs, associations, civic organizations, and the like, according to our tastes and talents, and we meet the obligations and duties which such memberships, as well as our citizenship, inevitably place on us.

WE CAN HOLD our heads high in the community because we *are* telephone people. It is a business devoted to the service of

mankind, contributing to man's social and economic well-being and personal satisfaction. And because mostly we are serving the people among whom we live, we have won their regard and respect. Telephone people, they feel, are *fine* people.

Of course, we are also part of a nationwide system, and we can connect each Main Street telephone with just about any other in all the world. And in this association there is pride and strength. *Pride* because our own accomplishments and the accomplishments of those who have gone before have made ours the most modern, most used, most efficient personal service. *Strength* because this great system of ours meets the social, economic, political, and defense communication needs of this nation, and thereby contributes toward harmony, productivity, prosperity, and world leadership. To be a member of so dynamic an organization is indeed something to be proud of.

Let's not forget, in this rightful pride, that to be a member is to be an individual: an individual helping to bring to other individuals the benefit of this very personal, very intimate service rendered through and symbolized by the telephone. We can talk, often we have to talk, about our millions and our billions, our big this and biggest that. But let us not build a curtain of statistics through which we cannot see the community.

Because that is where we started, that's where we are now, and that's where we'll always be—providing a neighborly service to our neighbors.

Important new devices developing out of solid state research at Bell Laboratories may have results extending beyond their application in this business

WHAT IS SCIENCE DOING TO ELECTRONICS?

RALPH BOWN

Vice President, BELL TELEPHONE LABORATORIES

This is the substance of a talk which Dr. Bown has given on several recent occasions to limited groups. He has now acceded to our request to put it in writing so that we may make it available to a much wider audience of telephone people. EDITOR

I LIKE TO THINK OF SCIENCE as impinging on man in three ways.

First, there is man as a piece of living, self-renewing protoplasm, which is the broad realm of the biological sciences.

Then there is man as a mechanical organization of parts capable of doing physical work and of transporting itself. Here man is affected by those sciences in which power and energy are dealt with.

Thirdly, there is man as an intellectual being capable of thinking, and of projecting himself to control events and to exchange information with his fellow beings. In this aspect the appropriate fields of science are identified through words like *communication*.

There are, of course, other aspects of science in relation to man: for example, the cosmic and earth sciences like astronomy and meteorology, which relate to his environment. And there is man as a communal being, in which we have psychol-

ogy and the so-called social sciences to include. Furthermore, there is the whole spiritual side of man, where science does not tread. But for my present purposes I prefer to direct your attention toward the first three I have mentioned, for significant things have been happening in these realms which will affect man's future.

In the biological area a closer and closer approach is being made to some of the secrets of life itself. A young graduate student (an F. B. Jewett Fellowship holder, incidentally), sealing up some aboriginal gases and water in a flask and subjecting them to heat and electric sparks, found he had created amino acids, which are essential organic chemicals of living material.

Two other young chemists have recently synthesized sugar out of simple inanimate chemicals. In nature, sugar is a product of photosynthesis by plants which is the ultimate source of all food.

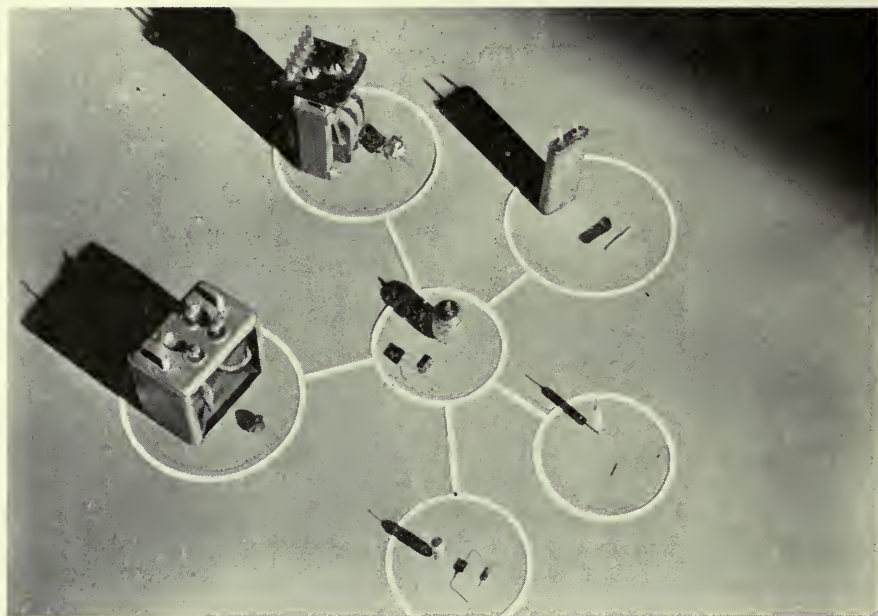
Biochemists have synthesized a protein-

like polymer from amino acids. Hair, nails and hoofs are polymer proteins.

Biologists are penetrating the chemical mechanisms of cell behavior.

When I talk to my chemical friends, I find them optimistic that we may be on the verge of a great "break-through" in man's understanding of the life process. The repercussions which this could have on the

ning some forty years ago with the invention of the audion tube. The repercussions have brought us world-wide telephony, radio broadcasting, television, and military applications stemming from radar. One may well ask, is this not a burned-out field of past glory? Can science do anything here which will further modify man's way of life very much?



In the center circle, a miniature vacuum tube looms large over its junction transistor counterpart. In the outside circles, sub-miniature apparatus components for use with transistors contrast sharply with their predecessors. From the top, clockwise, are transformers, capacitors, resistors, tantalum capacitors, and inductors.

daily life of man in health and in disease would be profound.

In the second realm, that of the power sciences, we have just seen a great break-through in the discovery of nuclear energy. The impact of this scientific advance on the political and economic life of all of us is already too evident and disturbing to require further characterization.

The field of communications and control witnessed a great revolution begin-

It is to this question I would like to address my remarks—starting in a somewhat roundabout way.

A Simple Picture—Then

As I LOOK BACK to the time when I was studying electrical engineering in college, it seems now as though it was a pretty simple matter. In addition to some basic physical laws, we had four kinds of material. We had conductors such as copper, and as



A single crystal of germanium grown at Bell Laboratories and purified by the new zone-melting process. The operation of transistors depends upon the extreme purity of the germanium which is the heart of the device. By the zone-melting process, germanium can be refined to a degree where there is only one foreign atom present for every ten billion atoms of germanium.

insulators we had textile fibers, glass, mica, and so on. Then we had iron with its magnetic properties, and, finally, a variety of structural materials—brass, steel, wood, and the like. Covering copper wire with insulating fibers, we could wind it around iron cores to make magnets; and by elaborating these in different structural ways we could make dynamos and motors and door bells and telephones. It now seems like a simple picture.

At just about that time, when I was a student, the vacuum tube was developed into a working device—and the electronic age in which we now live began.

During the growth of the electronic age in our own lifetimes, we have seen other spectacular effects of science on the life of man; for example, the products of synthetic chemistry (we also call it the plastics age) and the evolution of internal-combustion motorized surface and air transport (the age of flight).

While all this has been going on, and the nuclear physicists, tearing apart the atom, also have occupied a large fraction of the stage, some unobtrusive small groups of other physicists, in association with chemists and metallurgists, have been quietly investigating the simple solid materials of our high-school chemistry to find how nature builds up their intricate crystal structure from the atoms of their constituent chemical elements. This work of really understanding the fabric of these good old-fashioned metals and oxides and mineral-like compounds is called Solid State Physics.

One of the most powerful of the solid-state research groups is at Bell Telephone Laboratories, and out of its work on understanding semiconductors has come, as you all know, our invention of the transistor. I do not want to talk tonight about transistors, except to be sure you all have a sophisticated understanding of the true significance of the transistor. Rather, I would like to say a word about other results of this research work.

In order to get at the basic nature and properties of a material, one would like to have a sample of it in its simplest purest state: that is, as a single large crystal of the material with all impurities removed. It is for this reason that so much of the scientific research in our laboratory has been concerned with growing crystals of all sorts of material—not simply crystals for filters, a subject already much publicized—but

crystals of metals and compounds having interesting conducting or magnetic or insulating properties.

In the course of trying to get pure single crystal germanium, one of our gifted young metallurgists * has invented a powerful method of purifying and crystallizing called zone melting or zone refining. Germanium produced by this process is probably the purest substance ever achieved by man. Measurable impurities exist only to about one part in ten billion.

I would like briefly to describe this process because it illustrates so well how simple and obvious new things can be, once some uninhibited mind has had the insight to discern them.

When a liquid in which a solid material is dissolved freezes, nature decrees that the "ice" crystals first formed at the edges shall be quite pure: that is, they will contain little of the dissolved solid matter, which therefore becomes concentrated in the unfrozen liquid. As more liquid freezes, the concentration of the foreign material rises until it also tends to be caught in the freezing and the last ice formed contains the most impurity. Obviously, if we can now cut away the last formed from the earlier frozen material, we will have a purer product. This is a long known and long practiced but slow, tedious, and inaccurate method of purification.†

In the zone melting process, the raw material containing impurities is put in a

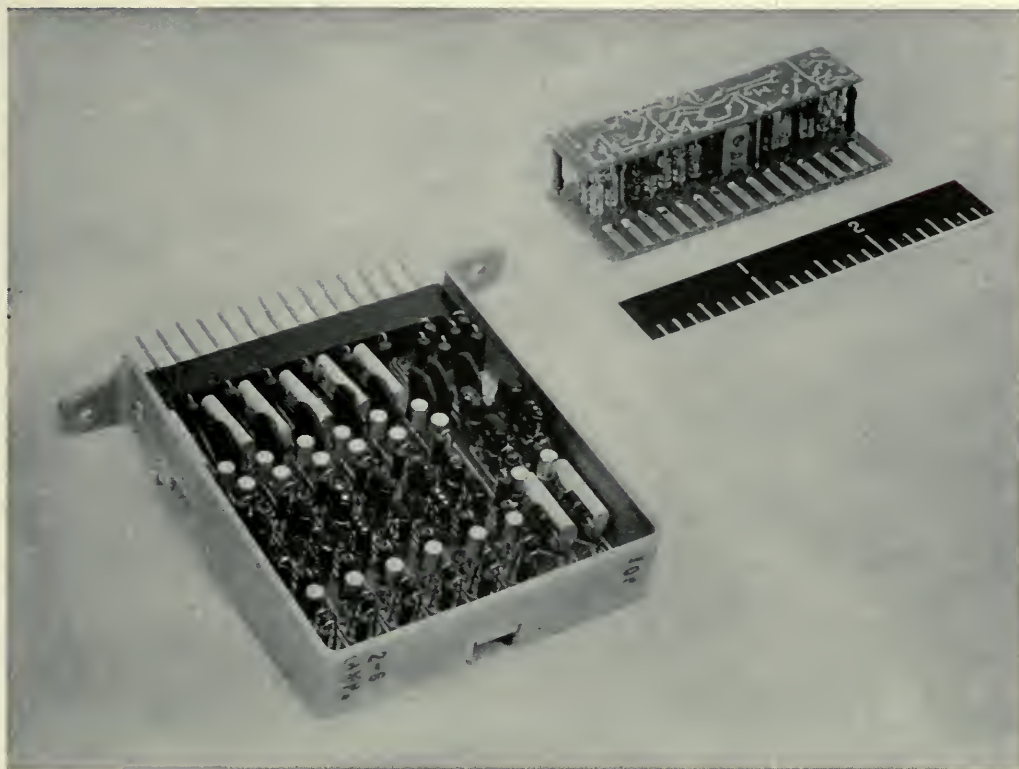
long narrow shallow crucible quite appropriately called a boat. Then a coil of a few closely spaced turns of heavy copper wire carrying high-frequency current is put around one end of this boat so that the semiconducting material is heated by electromagnetic induction so hot it is melted just at that spot. Pushing the coil slowly along the boat causes this locally heated region, which exists only inside the coil, to travel along the boat as a little pool or zone of molten metal. The raw material melts as it comes into the hot zone and freezes as it passes out of the hot zone. In accordance with the natural law referred to above, the refreezing material tries to be pure and the dissolved impurities stay in the liquid zone and are swept toward

Adjusting equipment in the vacuum vapor-plating machine used in the experimental production of miniature capacitors at Bell Laboratories. During the plating process, the bell jar, here shown raised, is lowered over the metalizing equipment and the machine evacuated.



* Since the speaker felt he was unable appropriately to mention all those making important contributions to the various things discussed, he chose to mention no names for credit. He himself has had no technical relation to the developments discussed other than that of an enthusiastic on-looker.

† Just by way of analogy, a barrel of hard cider set out on a cold night will freeze a jacket of water ice surrounding a liquid core of concentrated alcohol, water, and other less potable products. One can then break the ice shell and dip out a heady liquid I will not attempt otherwise to describe.



The amplifier unit for experimental electronic switching apparatus (left) measures only $4\frac{3}{4}'' \times 4\frac{1}{4}'' \times 1''$, yet it contains 94 components: 16 alloy junction transistors, 16 condensers of two types, 20 diodes and 42 resistors. The memory package (right) will be one of the sub-assemblies of a digital computer. Although its cubic volume before casting, as shown, is only 1.6 cubic inches, this package contains a point-contact transistor, three transformers, nine resistors, seven ceramic capacitors and 23 diodes—a total of 43 components in all—as well as two printed circuit boards and 15 feed-through wires.

one end of the boat by the movement of this zone.

The boat can be passed through many such coils in sequence or repetitively passed in the same direction through one coil. The result is the same—the leading end of the boat becomes pure and the trailing end becomes the repository of the impurities. Chopping off the contaminated end and repeating the process can lead to extremely high degrees of purity. This simple but powerful process has possibilities of wide application in metallurgical and related fields.

Coming back now for a moment to the transistor, I do not propose to go into how it is made or how it works—but only what it is.

The transistor is an electronic valve or amplifier which can operate efficiently down to the lowest levels of signal power. The important word here is *efficiently*. The vacuum tube is a good low-level amplifier; but as such it is not efficient, since it consumes something like a watt of power even though it is operated to produce only a few millionths of a watt or less signal power output. Now the transistor can live

and work on such an assignment with a total power requirement or ration of only a few times its useful output: in the theoretical limit, only two times, since it can be 50 percent efficient even at the lowest levels. All other aspects of the transistor are relatively insignificant beside this great overshadowing fact. It is a truly new thing in the world—an efficient micro-electronic amplifier.

A large part of the work of electronic and communications apparatus is done with the signals at levels of a few millionths to a few thousandths of a watt. The power needed to run transistorized apparatus at these levels is many times less than that needed for equivalent vacuum tube apparatus. Thus the transistor sets an entirely new standard for both physical and electrical magnitude—literally flea size and flea power.

Other Circuit Components

BUT OTHER THINGS than amplifiers are needed in electronics circuits. What of them?

During World War II the Philips Company in Holland was under the control of the German occupation forces, but its laboratory continued to function in realms of science not comprehended by the military overlords. Under these circumstances, they devised magnetic materials which they called ferrites. These compounds of several metallic oxides have the electrical property of high resistance, which means they can be used in solid chunks without trouble from eddy currents even at very high frequencies. Mechanically, they resemble ceramics and are shaped, fired, and ground to finished size like ceramic parts. Using ferrite cores, we can now make transformers and inductance coils of mi-

nute size which will work with the fastest signals.

And so, to look back a moment, we now see our old-fashioned metal conductor has in today's electronics had added to it a miniature semiconductor amplifier and the magnetic iron can be replaced by miniature "porcelain" magnets. Only two other items are needed to provide all the building blocks used in most electronic circuitry: resistors and capacitors, or condensers as we used to call them.

Resistance units we have always been able to make as small as desired provided the power involved was not so much as to make them get hot. The resistors invented and developed in our laboratories before and during the war, using carbon deposited as a sort of hard soot on ceramic rods, are particularly well adapted to use in low-power miniature circuits requiring high accuracy.

An electrical condenser (there is one in every subscriber's set) is composed of two sets of metal sheets inter-leaved with each other but separated by insulating sheets. The traditional material has been tin foil and paper. Recently the Western Electric Company has pioneered into manufacture a condenser in which the metal sheets are replaced by a very thin zinc coating condensed from metal vapor in a vacuum chamber directly on the paper surface. This process employs technology in part developed in the Laboratories and in part adapted from Germany. But even these condensers are enormous compared to transistors. Our latest development is a completely solid condenser constructed from the common chemical material manganese dioxide, combined with a piece of the metal tantalum riddled with microscopically tiny spongy pores which give

the mass a tremendous amount of surface. Capacitors of large electrical capacity but very small physical size can be made this way.

So we now find ourselves with a complete set of the four parts used in electronic circuits—amplifiers, magnetic coils, resistors and capacitors—all of watch-part size and using peewee power to operate.

New Tools for a New Future

THESE FOUR NEW TOOLS of the electronic art are based more or less directly on the results of recent fundamental studies of solid materials. They are already taxing the ingenuity of the structural designer. Here are circuit elements which have to be assembled under a magnifier with tweezers, or preferably by automatic machines. Thousands of them can be crammed into small space without burning themselves up with the heat generated. Potentially they are reliable and long lived and, with the infinitude of possible combinations, they are versatile.

What are they going to do for us?

Of the number of things which clamor for consideration I select three of special interest to telephone people.

Knowing that transistors can do things now done by relays, we think first of electronic switching—and in truth the opportunity is very great. The idea of great bays of equipment compressed into soap-box size is not unreal and it is coming, but it is not imminent. Much research and development remains to be done and important changes in other parts of the plant will be needed. The voice currents in our plant are already down at transistor power levels—milliwatts at most—but the signaling currents now used are much too powerful for transistors and much more powerful than seems really necessary. A

revolution in signaling, running right out to the subscriber's bell and dial, is in the making as electronic switching finds its ultimate place in the telephone plant. Here again the transistor is the tool needed for the job.

Electronic switching under another name is already a considerable business outside the telephone field. It goes by such names as Digital Computing and Automation. Two years ago the Institute of Radio Engineers organized a professional group on Computers. It already has over two thousand members. A recent issue of its proceedings devoted to computers had 47 technical papers requiring 300 pages of text and figures. Five of the papers came from Bell Laboratories. A recent survey

In a development shop at Bell Telephone Laboratories, thermosetting plastic is dropped from an eye dropper to cast a terminal plate for a sub-miniature transformer to be used in a computer. The mold at which the technician is working holds ten terminal plates.



showed over a hundred different types of computers in existence.

Mathematicians have shown that any mental operation which can be reduced to routine or to a set of rules can be "mechanized" by digital computers. Information theory, originating in our own Laboratories, has shown that any form of information or communication may be electrically packaged and transported as digital signals.

Many of the computers use forced-draft air to absorb the heat from the filaments of the hundreds of vacuum tubes they contain. It does not require much credulity to see that miniature transistor circuitry is about to revolutionize this kind of apparatus and that ultimately it may do for the clerical, accounting, and other mental routine work of man what power-operated machinery has done to relieve his physical burdens.

A favorite of the predictor is the "wrist watch radio." However absurd may seem some of these predictions, there is one aspect which we telephone people can view with interest. The ideal of telephone service is that anyone should be able to talk with anyone he chooses when they mutually agree to talk. This assumes there is some avenue of contact. In the last analysis this avenue is the telephone bell. Why should the range of the signal be limited to earshot? A radio "paging" system is theoretically capable of reaching any correspondent just about anywhere. Transistorized radio receivers will bring this theory nearer to universal practicality.

We are all experiencing what might be called a conditioning or a reorientation to our environment through television broadcasting. We are becoming used to seeing as well as hearing distant events. We can now project ourselves instantaneously to

another place not as a blind man but as one in possession of his two most important observing senses. As time goes, on what will this mean to us?

Let us suppose, as J. J. Carty * liked to do, that radio came before wire telephony and that our first experience in hearing distant sounds was by broadcasting. What a marvel private personal telephone service would have seemed! And how quickly and naturally it would have followed unless impeded by technical or economic factors.

Today we have television cameras and receivers, both large and small, which are capable of development into economical forms suitable for 'most any service. If we had signal pathways able to interconnect such terminal devices as cheaply and in as many non-interfering ways all at the same time as we do telephone instruments, what do you think would start to happen?

We are not yet able to make such multitudinous and economical connections, but private visual services are nevertheless already beginning to appear in factories and banks and for other industrial purposes. That is why for several years one of the most important objectives of our Laboratories research programs has been a conductor system which can do for man's vision what the cable pair did for man's voice. The transistor and its associated circuit elements stemming from solid state research are a powerful aid toward that achievement.

Who, in 1876, could have visualized our mode of life—in which the ability to talk beyond earshot subtly molds one's every move? Who, in 1954, can visualize a future mode of life in which seeing is limited not by distance or by walls, but only by then accepted customs of volition and courtesy?

* Formerly vice president and chief engineer of A. T. & T. Co., now deceased.

EXCERPTS FROM THE ANNUAL REPORT FOR 1953

Bell System progress took many forms in 1953. Outstanding was the steady improvement in service quality. Operators handled calls on the average with greater speed. Maintenance men kept the service even more dependable, more free from mechanical failure, than at any time in the past. Installers and construction crews put in more and more telephones and lines and switching equipment of new design and greater capabilities.

All the progress told in these pages is the work of men and women: the people of the telephone companies, of the laboratory, of the manufacturing and supply organization. To say that 1953 was a constructive and successful year is also to say, "They made it so."

The employee group at the end of the year numbered about 703,000. Many are veterans in telephone work; in fact, nearly 107,000 employees have served in the Bell System for 25 years or more. But there are many more who are young in the business. Through the years telephone people have built a fine working association, and they continue to do so today.

Some 15,000 employees are on military leave from their companies. Nine out of ten who have concluded their military service have returned, we are glad to say, to Bell System work. In the period of fighting in Korea, more than 100 gave their lives.

The Bell companies last year cut the number of held orders by a third. We were able to give an increasing proportion of new residence subscribers just the type of service they wanted, and we also cared for requests of more than a million party-line customers who had asked for individual lines, or lines they would share with fewer people. Nevertheless we still have another million requests of this kind on hand and new ones come in every day. This is all urgent business and continuing heavy construction is essential to a first-rate job of meeting our customers' wants; this despite the fact that our postwar expenditures for new construction have already reached a total of more than nine billion dollars.

The people of the Bell System are devoted to their calling and to the needs of the people they serve. Ours is a service of neighbor to neighbor—human, personal, friendly, courteous. In all we are trying to do, we have been greatly assisted by the constructive interest and support of the share owners; to them goes our sincere appreciation. To our fellow citizens in community and nation, we pledge our continuing utmost efforts to provide fast, dependable and always better and more helpful telephone service in the years ahead.

With eighty-four million telephones in service, the current rate of increase should bring the global total to a hundred million in another two years

TELEPHONES IN THE WORLD OF TODAY

ELIZABETH WRENSHALL

CHIEF STATISTICIAN'S DIVISION, COMPTROLLER'S DEP'T., A. T. & T. CO.

MORE THAN eighty-four million telephones were in service in the world at the beginning of 1953. The average annual increase for the total world for the five years previous was about 4,700,000. If the same gain is continued, the 100-million-mark will be reached some time in 1956. It is significant that in the United States the 50-million-mark was reached last November.

The January 1, 1953, issue of *Telephone Statistics of the World*, a survey of world telephone development compiled annually by the Chief Statistician's Division of the American Telephone and Telegraph Company, was published recently. Data contained therein, relating to some 200 countries or regions and to about 600 cities, give a comprehensive picture of telephone distribution. Since a copy of the publication may be obtained through the Public Relations Department of the A. T. and T. Company by those interested in details of the survey, only a few highlights are given here.

The telephonically important countries listed in the tables on the next page vary greatly with respect to location, population, and size. Eight of the countries are

in Europe, two in North America, two in Oceania, and one in Asia. Populations range from 158,000,000 in the United States to two million in New Zealand. Canada's area of 3,800,000 square miles is the largest of the group; Switzerland's, less than 16,000 square miles, the smallest.

Thus it may be seen that neither location, extent of population, nor size, in themselves, determine the degree of telephone development of a country.

Some of the largest countries have small telephone systems. China, with a larger population than any other country in the world, comprising about one-fifth of the world's people, has only twice as many telephones as serve the island of Cuba. India, with the second-largest population, more than 360,000,000 people, has but 200,000 telephones. The U.S.S.R. contains about one-sixth of the world's land-area. When statistics were last reported by them, telephone development was 0.5 telephones per 100 of the population, while at that time comparable development for the United States was 14, for Canada 11, for Sweden 10.

On the other hand, a few of the world's

**PRINCIPAL COUNTRIES HAVING MORE THAN
15 TELEPHONES PER 100 POPULATION**

January 1, 1953

The number of telephones in proportion to the population served is a significant measure of comparative development. During the year 1952 Australia and Norway joined the small group of countries having more than 15 telephones per 100 inhabitants. This grouping had comprised six countries since the year 1948, at which time Denmark was first included.

1. United States	30.3	5. New Zealand ²	20.9
2. Sweden	26.4	6. Denmark	18.1
3. Canada ¹	22.9	7. Australia	15.3
4. Switzerland	20.9	8. Norway ³	15.1

**COUNTRIES REPORTING MORE THAN
ONE MILLION TELEPHONES IN SERVICE**

During 1952 Switzerland passed the million-mark in number of telephones. The latest previous addition within this category was Australia, which attained its millionth telephone during the year 1949.

1. United States	48,056,308	6. Japan ²	2,250,000
2. United Kingdom ^{2 4}	5,915,972	7. Sweden	1,889,353
3. Canada	3,352,000	8. Italy	1,540,909
4. Germany, Fed. Rep. ²	2,976,953	9. Australia	1,342,961
5. France	2,644,910	10. Switzerland	1,012,590

¹Preliminary.

³June 30, 1952.

²March 31, 1953.

⁴Includes the Isle of Man, but not the Channel Islands.

large countries are among the best equipped from a telephone point of view. Canada occupies second place in area, third place in number of telephones and in telephone density. The United States, which has the fourth-largest population and the fifth-largest area, ranks first in number of telephones and in telephone density.

Telephones in High Places

CONTRASTED WITH these countries of great magnitude—some at each end of the scale from a telephone standpoint—are a few comparatively small countries which are among the best developed in the world.

Several of them are extremely mountainous. It might almost seem that mountainous regions are conducive to high telephone development, for Switzerland and the Scandinavian countries, with their difficult terrain, have, as we have seen, a higher development than many of the other major countries.

The fact that so much effort and money have been devoted to overcoming natural obstacles in installing and maintaining service in mountain regions, where storms and avalanches are hazardous and costly, testifies to the importance placed on voice communication. Annual Reports published by the governments of some of the coun-

THE WORLD

January 1, 1953

TELEPHONES

UNITED STATES	ALL OTHERS	EUROPE	ASIA
57%	11%	28%	4%

POPULATION

ASIA	EUROPE	ALL OTHERS	U. S.
53%	24%	17%	6%

tries which have to contend with these problems regularly discuss the damage done: not whether there was any, but how extensive it was—damage caused by unusually heavy snowfall and resulting Spring floods, or by ice-storms and by lightning.

Telephone lines constructed with great difficulty may slip and slide, and portions of them disappear completely. A circuit installed some years ago from Rome to an observatory on Monte Rosa in the Alps had to be rebuilt five times before it was successfully fastened in place. Lines buried for greater security may be chewed by rodents, then rebuilt above the surface only to slip and slide again. All this, so we may talk across mountains—because it is so much more satisfying to hear a voice than to receive a written communication.

One of the dramatic feats of telephony was the installation of the Trans-Andean Cable in 1929, when the highest buried cable in the world was laid across the towering and stormy Andes from Chile to Argentina's capital. Equipment had to be carried on the shoulders of Indians

who were able to withstand the physical exertion at such great heights. In the Alps, the Augustinian monks early had booths installed. They realized the value of the telephone in rescue work, as they patrolled mountain passes with their St. Bernard dogs in search of lost travelers. In Switzerland today there is telephone service in remote and isolated hamlets of the Jura and the Alps, in mountain hotels and Alpine Clubs. Italy claims the highest wire-connected telephone in Europe, with an installation on Monte Cervino at 11,500 feet above sea-level connected with the laboratory of the Italian Institute of Nuclear Physics. Winter maintenance problems are familiar to the men of several of the Bell System companies operating in northern areas and mountainous terrain.*

The great preponderance of the world's telephones are found in the United States and in Europe. As shown in the chart, the United States, with six per cent of the world's population, has nearly 60 per cent

* See "Operating in the Hazards of Deep Snow," Magazine, Winter 1952-53.

Telephones in the World

of the telephones. Europe has roughly one-fourth of both the world's telephones and population. There is an average of 30 telephones per 100 persons in this country, but only four per 100 in Europe.

Although there are now twice as many telephones in the United States as there are in Europe, this country has not always led Europe in actual number of telephones. It has, however, always led in respect to telephone density. For a period of seven years, beginning in 1891, Europe led numerically. By the end of 1898 the United States had 680,800 telephones as compared with 671,000 for Europe, and the margin in favor of the

United States has increased materially since that time.

Here and Abroad

A FEW GENERAL OBSERVATIONS on service in the United States as compared with that in some European countries follow:

Party-line service has contributed to the high level of telephone development in the United States. This type of service enables families in both rural and urban communities to have telephones who might otherwise be unable to afford them. Nearly 70 per cent of the homes in this country have telephones. The ratio of tele-

TELEPHONES IN CONTINENTAL AREAS¹

January 1, 1953

Continental Area	Total Telephones			Privately Owned		Automatic (Dial)		Connecting with Bell System	
	Number	Per Cent of Total World	Per 100 Population	Number	Per Cent of Total Tels.	Number	Per Cent of Total Tels.	Number	Per Cent of Total Tels.
NORTH AMERICA	51,430,400	61.1	29.7	50,960,300	99.1	37,743,300	73.4	51,415,800	100.0 ²
MIDDLE AMERICA	627,400	0.7	1.2	568,800	90.7	445,300	71.0	616,900	98.3
SOUTH AMERICA	2,094,800	2.5	1.8	1,021,500	48.8	1,614,400	77.1	1,991,000	95.0
EUROPE	23,785,100	28.2	4.0	3,762,600	15.8	17,184,000	72.2	21,805,600	91.7
AFRICA	1,084,300	1.3	0.5	20,000	1.8	741,900	68.4	934,100	86.1
ASIA	3,268,000	3.9	0.2	209,100	6.4	752,100	23.0	2,240,000	68.5
OCEANIA	1,910,000	2.3	12.2	134,500	7.0	1,252,800	65.6	1,900,600	99.5
WORLD	84,200,000	100.0	3.4	56,676,800	67.3	59,733,800	70.9	80,904,000	96.1
United States	48,056,308	57.1	30.3	48,056,308	100.0	35,500,000	73.9	48,051,897	100.0 ²

¹Partly estimated; statistics reported as of other dates have been adjusted to January 1, 1953.
²Actually all can be connected with the Bell System.

phones to population in the U. S. is eight times as great as that in Europe.

In Europe, party-line service is not generally offered. In France, for example, it exists, but is made available only in a few instances subject to Administration approval.

Ordinary toll service in Europe is not, as a rule, available on a "no delay" basis. The "lightning call," offered at an increased rate in some countries, approximates the speed of service of the ordinary toll call of the Bell System.

In some European countries the subscriber may purchase his telephone instrument from a private manufacturer. Although the instrument must be checked and approved by the operating Administration, a variety of types of telephone, both standard and de luxe, may be connected to the same system. In the Bell System, only standard sets manufactured to rigid specifications and supplied by the Company may be used.

In the United States, telephones are operated under private ownership. Although the Bell System, through the American Telephone and Telegraph Company and its 20 principal telephone subsidiaries, operated some 80 per cent of this country's telephones on January 1, 1953, there were nearly 5,300 other privately-owned companies operating about 8,600,000 telephones.

Nearly 85 per cent of Europe's telephones are operated under government ownership. In the majority of cases, the government appoints a Minister of Communications under whose jurisdiction are the Departments of Posts, Telegraphs, and Telephones—and in some cases Radio—each Department being headed by a Director General.

In nearly every instance the telephone systems of Europe were initially developed through private enterprise, then later purchased by the governments. Germany is an exception, for Director of Telegraphs Heinrich von Stephan was so interested in the potential practical application of the telephone that by 1878 he had had fifteen of his country post offices which were without telegraph service connected by telephone. Bismarck, too, appreciated the convenience of the telephone, and had a line constructed between his farm and his palace in Berlin. It has been said that this was Europe's first toll line. Whereas in most countries exchange service within a community was the basis of early public service, the local areas being gradually linked by toll lines, in Germany the toll lines came first as a substitute for telegraph facilities.

The largest government-owned system in the world is that of the United Kingdom.

South of the Border

LATIN AMERICA's association with the telephone dates from the Centennial Exposition in Philadelphia in the year 1876, when the enthusiastic interest of a South American, Dom Pedro de Alcantara, Emperor of Brazil, attracted the attention of some Very Important People to Alexander Bell's invention.

It may seem strange that after the Emperor returned to Brazil he allowed three years to pass before having public telephone service installed in his country, for at the end of 1879 there were 31,000 telephones in the United States. Local service was established in Brazil and Chile in 1879, in Argentina in 1881. However, establishing and maintaining large sys-

tems requires a large amount of capital. Most Latin American countries had to interest foreign investors, first in Europe and later in North America, in supplying the necessary funds. These early systems were largely confined to the corporate areas of towns, not only because they were of diverse ownership, but because they served concentrations of population in areas which were widely separated by jungles, mountain ranges, and other uninhabited regions. Lack of an over-all unified system of practices further hampered telephone development in Latin America.

Argentina's system, with nearly one million telephones, is Latin America's largest, while those of Brazil and Mexico rank second and third respectively.

Other Lands and Races

THE TELEPHONE is still a mystery to most of Africa's 213 million people. Africa, second in size of the continents, has the lowest population density of all the great land masses with the exception of Australia. The Sahara Desert alone is larger than the United States. Seventy per cent of Africa's telephones serve 15 per cent of its population, located in the southernmost country, the Union of South Africa, and in the small areas of Algeria and Morocco on the north coast.

Asia is the land of extremes. Among the continents, this is the one with the largest area, population, inland seas, peninsulas, and rivers that never find their way to the sea. It has the world's most complex pattern of racial mixture, the oldest of civilization's histories; and it has some of the hottest, coldest, wettest, driest, lowest, highest spots on the face of the earth. The blistering heat of the Arabian desert is exceeded only by that of one part of Africa's Sahara. The cold-pole of the world is in north-

eastern Asia, where the average annual temperature is 3.4 degrees Fahrenheit.

Half of the world's people live in Asia, most of them in the coastal areas. The mountainous interior comprises nearly one-third of Asia's land surface. Here are located Afghanistan, Bhutan, Nepal, Mongolia, the western Chinese provinces, and Tibet. With the exception of Afghanistan, little is known of their populations, less of their telephone systems. Afghanistan has nearly 6,000 telephones, about half of them in the city of Kabul, and an estimated population of twelve million.

Asia has about 3,300,000 telephones. While most of its countries have been slow to adopt the techniques of the West, Japan is a notable exception. Enthusiastic telephonists from the beginning, Japan now has some 2,300,000 telephones, or 70 per cent of Asia's total.

Oceania includes thousands of mid-Pacific islands, most of which have not even been named, extending from the Philippines and Australia on the west to the Hawaiian and Pitcairn Islands on the east, and from New Zealand on the south to the Midway Islands on the north.

With about two million telephones, Oceania ranks second among the continents in respect to telephone density. The two countries of Australia and New Zealand had remarkable early telephone development, for at the beginning of 1914 they had 3 and 5 telephones per 100 of their respective populations. Comparable figures for some other countries at that time were Great Britain 2, the German Empire 2, France 1, Spain 0.2, and the United States 10. As indicated in the tables at the beginning of this article, Australia and New Zealand continue to be among the countries which have the highest telephone development.

In today's economy, a competitive, aggressive frame of mind helps telephone people to provide better planned as well as more service to our customers

NOW IT CAN BE SOLD!

JUSTIN J. MURPHY

Sales and Servicing Engineer, COMMERCIAL DIVISION, A. T. & T. CO.

MAKE SALES? TODAY? YES INDEED—the telephone companies across the nation are once again ringing doorbells, suggesting new and additional services and new uses for existing services.

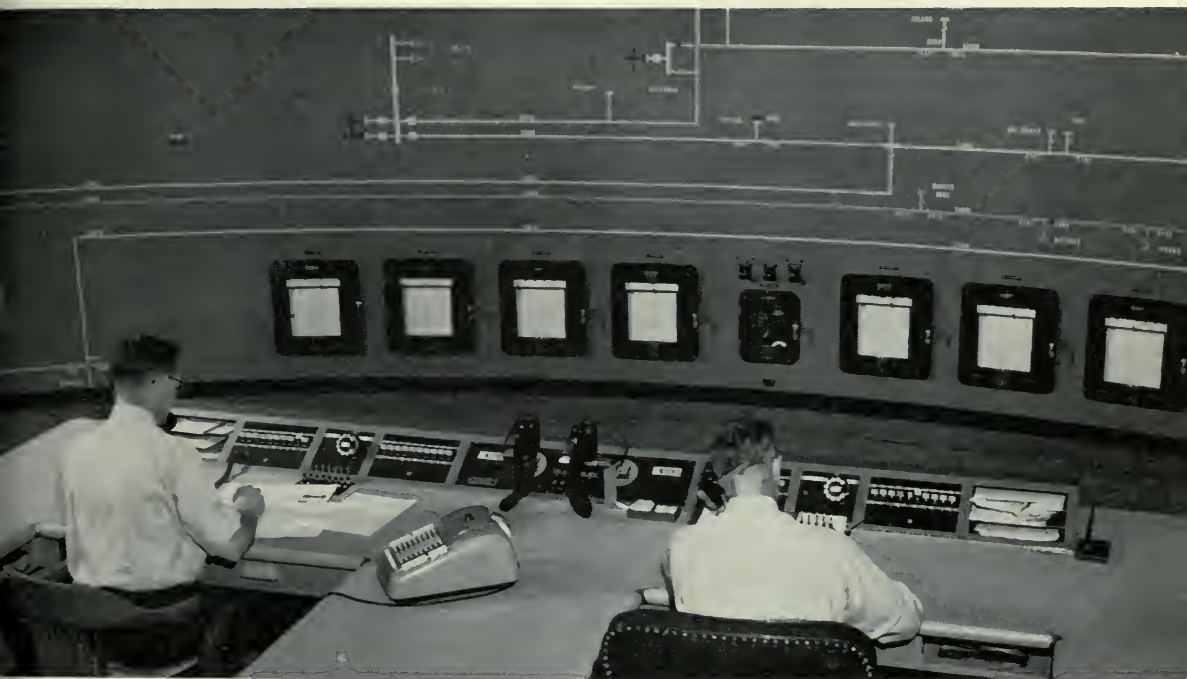
“How can this be?” you ask. “Don’t we still have held orders on hand, and requests for improved grades of service?” Of course we do; but in many places the companies have caught up with the demand—and are moving fast to regain the initiative in meeting customers’ service requirements. And as the months roll on, more and more exchanges, districts, and areas will be on top of demand and out for sales!

The Bell System has never thought of SERVICE as a passive thing, and the Bell Companies and Bell people have been restless and dissatisfied with the “demand” basis of operations forced on us during the war and post-war years. No wonder, then, that, office by office and item by item, the companies are taking stock of their opportunities to bring more and better telephone service to their customers. Bell service is dynamic—always improving, always growing—and every Bell Company wants all its customers to reap the full benefits of the service. The companies refuse to take for granted that customers have all the service they need, or have the right grade of serv-

ice, or that they are making the most effective use of the service they have. They believe that even the best product must be sold.

Have you ever wondered how many of our customers don’t know that extension station service is available? Or how many customers still think we would like them to make their long distance calls as brief as possible? How many potential customers have not asked for an improved grade of service because they “know” that only party-line service is available? Restrictive advertising, and business office explanations of why the answer in recent years had to be “no” to many service requests, unquestionably have had a continuing effect on customer knowledge and understanding. Realization of this suppressed demand has sharpened the determination of the companies to see that their customers have all the service they want, when and where they want it, at the earliest possible moment it is available.

So it is that we find examples of sales activities across the country. Non-user sales in the State of Washington—saving disconnects in Chicago—additional directory listing sales in Southern New England—regrade sales in Indiana—extension sales in Nebraska.



This two-position dispatcher's PBX gives consolidated control of various communication services used by a large power company.

I. Selling Special Services

THE MOST RECENT and best illustration of seizing the initiative for sales is in the field of long distance messages. In mid-1953, the rate of gain in long distance messages started to decline. As a result, Long Lines messages for 1953 showed only a five percent gain over 1952 as contrasted with gains of eight percent and higher in previous years. Associated Company messages likewise declined, but less sharply. Declines in the rate of gain were System-wide, and were experienced in varying degrees by most companies and areas.

At the same time, the Long Lines and Associated Company programs for long distance circuit additions were rapidly increasing our ability to handle additional volumes of long distance business. The companies have been quick to recognize

the sales opportunity thus presented, and already have about 300 men in the field calling on selected business customers and outlining the advantages to be gained through the use of long distance services. These salesmen are specially trained and are following a plan for sales which was developed and proven during 1948 and 1949 by a three-city trial in Cleveland, Pittsburgh, and Philadelphia. Several other cities also gained experience with the plan about that time. The sales approach is based on suggesting to the customer uses of long distance which have been time-tested by other customers. Hundreds of business customers were interviewed in the 1948-49 period by the Associated Companies to find out how they were using long distance. The results of these inter-



Private mobile radio brings switching instructions to this locomotive engineer from the yard dispatcher.

views were summarized into some 300 cases which are included in a reference manual called "Digest of Long Distance Usage." In this volume, also, the particular application of long distance to the various functional areas of business—e.g., sales (by far the largest of the functional uses), production, administration, etc.,—has been thoroughly delineated for the salesman.

Long Lines has appointed coördinators at most field and division offices to assist in the training of salesmen and to work with the companies in coördinating sales efforts involving more than one company. In addition, Long Lines will keep the Digest of Long Distance Usages up to date and broaden its coverage as additional uses are developed.

Sales aids and brochures to help in the long distance selling job have been prepared and made available to the com-

panies. Such sales aids feature specific uses of long distance service and, where found appropriate to a prospect, can be left with him as a reminder. One example of a sales brochure, prepared by Long Lines, is that entitled "The Salesman on the Road" which details "key town" and "skip stop" plans for more effective utilization of their time by salesmen on the road.

The telephone companies have found that their long distance salesmen are being welcomed by business customers anxious to build additional business or maintain present levels in view of the economic ad-

A field man uses private mobile radio to discuss the situation at a remote gathering station with the engineer at a pipeline compressor station.



Now It Can Be Sold!

justment being experienced. Still other customers are impressed with opportunities for increased efficiencies offered by the speed of long distance service and the immediate answers made possible through personal discussion. Long distance revenues already represent over one-third of total System revenues, and the companies are planning now for the additional salesmen and supervision needed to develop the full revenue potential this market represents. It is planned to cover the market in two years.

Closely associated with the long distance sales program are the sales efforts directed towards customers with private-line requirements. Private-line voice and record services meet increasingly important communications needs. Exploration of long distance uses with our customers

will broaden our coverage of their requirements for private-line services. Opportunities for teletypewriter exchange service (TWX) will also be uncovered.

Right-of-Way Sales Growing Each Year

AGGRESSIVE SALES EFFORTS have been under way throughout the System for several years with the so-called right-of-way companies: pipe lines, power companies, and railroads—and with considerable success. Year by year, sales of intercity private lines, private mobile systems, and related equipments to these customers have shown a steady increase. Annual revenues from intercity private lines, private mobile systems, and related equipments sold to these customers exceeded \$2,000,000 in 1952 and \$3,000,000 in 1953. The present year should see sales of over \$4,000,000.

This scene is in the C.A.A. Air Route Traffic Control Center at the Washington National Airport. Nearly 100,000 miles of private line talking circuits terminate in Bell System key equipment at the 26 traffic control centers.



The economy and flexibility of top-quality Bell System services have proven most attractive to these customers, whose communications requirements are becoming more and more complex. Use of Bell service has allowed them to devote capital dollars and engineering talent to their fundamental undertakings in the service of the American public. In addition to new and "growth" facilities, there have been many instances where these customers have de-

ecided to obtain all its communications facilities from the Bell Telephone Company of Canada, and agreements have been reached which will see this accomplished over the next five years. Two electric power companies, in New York City and in Chicago, recently have arranged with the telephone companies serving them to provide the sizable private mobile systems which they have owned for some years.

AIR-GROUND RADIO SERVICE



cided to have all their communications needs met by the commercial telephone companies. Privately-owned facilities, including wire and carrier useful to the telephone companies, and private mobile, have been purchased from these customers. Notable cases include one of the largest petroleum companies in the country, whose extensive communications network was purchased by the Southwestern Bell Company and Long Lines. The largest power company in North America has also

Private Mobile System Sales Growing Fast

THE COMPANIES have also been highly successful in meeting the needs for private mobile systems on the part of various federal, state, county, and city agencies. Sales to these customers, together with those to industrial customers, trucking companies, and others, exceeded in 1953 the total sales of the previous four years. That satisfied customers mean more sales is amply illustrated in this field by the fact that of the 3,400 new units added to private mobile



A department store executive and a telephone company service engineer discuss the store's new dial P.B.X. while a Plant man puts the finishing touches to the installation.

systems in 1953, about 25 percent represented additions to or growth of existing systems. Such radio increasingly is becoming an important part of our customers' communications requirements, and we are glad to have them look to us for all their communications needs. Notable sales of private mobile systems in 1953 included, in addition to the power company cases already mentioned, a state police system, a state thruway, and an aircraft manufacturer (a low-power industrial system for lift trucks). Large manufacturing companies, trucking concerns, mining companies, and newspapers also leased private mobile systems from Bell Companies during 1953.

Aviation Sales—On The Threshold of a Tremendous Market

THE COMPANIES have been selling aggressively in the aviation field also. During the past 15 years commercial aircraft speeds

have tripled and larger planes and more frequent flights have increased the number of passengers carried from one million to 31 million per year: developments which have enormously expanded the need for adequate high-speed communications. Already new techniques for handling air traffic entering congested terminal areas are being introduced. Direct contact with aircraft flying at distances up to 175 miles from the terminal is being provided through remote VHF base radio stations by both the airline companies and the Civil Aeronautics Administration. The Bell Companies see these requirements as additional opportunities for the provision of the base stations as well as the leased circuits involved.

Negotiations have been undertaken with all of the major airlines and have produced orders for the ground components of three air-ground radio services. By far

the largest of these is a coast-to-coast integrated network of some 75 stations for Aeronautical Radio Incorporated. This system contemplates radio coverage for United Air Lines of an air corridor 60 miles wide and from 1,000 to 20,000 feet high, spanning the continent from Boston, New York and Washington through Chicago and Milwaukee to Denver, Salt Lake City, and San Francisco. Additional legs will extend from Salt Lake City to Pendleton, Portland, Spokane, Seattle, and Vancouver, B. C.; and from San Francisco south to San Diego and north to Portland. This system will be used by United for operational and air traffic control through contact with planes in flight. An application to establish the initial section of this network is now pending.

Single-station air-ground systems have been sold to Trans-World Air Lines at Phoenix and to Los Angeles Airways at Los Angeles. This latter company flies the mail by helicopter to some twelve communities around Los Angeles. A number of proposals are in the hands of several other airlines. These include services in Ohio for TWA and American, a Washington-New York integrated point-to-point and mobile system for Eastern Air Lines, and stations on Sandia Mountain for remote operation from Albuquerque for TWA and Continental Airlines. The Bell Companies are optimistic that firm orders for these systems and others will develop soon.

In addition, the Bell System has undertaken to work with the Air Navigation Development Board and with the C.A.A. in the development of a common (civil and military) system of air traffic control. That part of the development which involves services which Bell now furnishes or may in the future furnish as part of its

common carrier undertaking is done at Bell System expense. The Western Electric Company, on behalf of the Bell Laboratories, has entered into a contract with the C.A.A. as contracting agency for the ANDB to assist with specific project developments incident to other communications aspects of the common system. Here again is evidence of Bell's determination

A new aluminum outdoor public telephone booth.



to stay abreast of—and to anticipate where possible—the needs of its customers. The size and complexity of aviation customers' communications needs, coupled with their responsibility for safe operations, emphasize the challenge and the opportunity which the Bell Companies face in this field.

That such radio services are not the only need of these companies is evidenced by the recent introduction of a new service offering called Interline Reservations Service and furnished to airline companies operating in New York City. This is a teletype service featuring centrally located switching equipment through which each air line's reservations office can communicate with the reservations office of every other participating air line in the city. This service considerably expedites the interchange of reservations necessary, for example, when a passenger on Eastern Airlines from Miami wishes to continue on American from New York City to Chicago. The air lines estimate that 20 per cent of all air lines passengers during 1953 used two or more lines in completing their trips, requiring about six million interline reservations. This new service is but one example of the willingness and ability of the Bell Companies to meet the communications needs of these fast-growing public service companies.

*Coin Telephones—Millions In Nickels,
Dimes, and Quarters*

ANOTHER MARKET attracting attention throughout the System is the public telephone market. Somewhat over 800,000 coin telephones, representing two per cent of total telephones in service, generate seven per cent of total System revenues. Take directory advertising billing, add private line telephone, private line tele-

typewriter and TWX revenues—and coin billing exceeds the total. And the experts in the field say that the revenue potential in this market has hardly been scratched. Perhaps the range between companies in the per cent of total revenues that comes from coin telephones (10 per cent to 3.5 per cent) is responsible for this belief. Or perhaps the number of cases where improved signs, improved location of booths, or improved illumination has substantially increased monthly revenues is responsible.

Or perhaps the remarkable success of outdoor, twenty-four hour booth locations supports this conviction. Believe it or not, there are many cases where locating an outdoor booth at a point already served by an indoor coin telephone has attracted substantial use to the outdoor booth with no adverse effect on the revenues from the indoor telephone. In many other cases where revenues did not justify adding a station, changing from an indoor to an outdoor coin telephone has doubled the revenue from the location.

There are now about 55,000 outdoor booths in service throughout the System, of which 25,000 were installed in 1952 and 1953. In February of this year, shipment of a new outdoor booth of special Bell Laboratories design was started by the Western Electric Company. The new booth is wider, higher, better ventilated—and so, more comfortable than the old. In addition, it is better lighted, has better signs and is more colorful. A choice of booth panels in three colors—red, green, blue—is available in addition to clear glass. Improved directory facilities are also provided. The new booth is made of anodized aluminum so that it will last longer and require less maintenance.

People in all the companies who are engaged in developing coin telephone business are busy seeking out new locations, hunting opportunities for additional installations, and finding improved locations for existing telephones. They are also removing public telephones which do not

fill a real service requirement, and are applying their specialized skills with signs and illumination to attract the user and encourage his calls. And of course the ten-cent minimum local rate now effective in most areas heightens the attractiveness of promotional efforts in this market.

II. Selling the Whole Line

WHAT ABOUT residence non-user, extension, and regrade sales? Here too the companies are meeting with real success. For example, the Pacific Telephone Company people in Washington tell us that in selected exchanges where the facility situation permitted, in 5,800 premises interviews with residence non-users they made sales to 1,550! Anxious to know more about these sales, they random-sampled 10 per cent of their first 350 sales. Of the 35 customers checked, 17 never had had service before!

Saving Customers

IN THE MONTHS of December 1953 and January 1954 the Chicago Area business office people worked on 1,800 "customer request" disconnects and saved 15 per cent of them. They also worked on 1,100 non-payment disconnects and saved 34 per cent. Keeping a customer is mighty good business.

Wasn't it Gene Sarazen who said "I always like to win the first hole in a golf match—then my opponent has to win two from me to be one up"? Saving that disconnect keeps us even, and when we sell two additional users, we're two ahead. In addition, we've got a customer instead of a final bill: we've preserved the revenues these disconnections represent; sold the customers again on the value of their serv-

ice to them; and avoided all the expenses in Commercial, Plant, Traffic, Accounting, and Directory incident to the disconnects. And we've made the customer realize that we value his patronage. Is it any wonder that where central office and outside plant conditions permit, this is often the first area in which the companies bring sales efforts to bear—by business office representatives and supervisors, by sales representatives, and in some cases by installers?

Chicago has also followed up on its "left in" station cases. Commercial representatives have made visits to premises where telephones have been left in place but not connected, to sell service. They report success in 25 per cent of the instances. When unsuccessful, the opportunity is taken to record information as to the non-user's reasons for not wanting service at that time and his ideas as to when he might want service—for use as a follow-up.

Customers Want Better Grades of Service

A RECENT CHECK of held regrade requests indicated that 67 per cent of these requests for improved grades of service were from customers on 4-party and multi-party lines—and 61 per cent of the total want individual lines! The Customer Attitude Study conducted by the Associated Companies in April of 1953 indicated that, of the 4-party customers interviewed, 33 per



A customer records a statement on his automatic answering and recording equipment before leaving his office unattended. Upon his return he will listen to messages telephoned by people in his absence. Two types are available.

cent were considering an upgrade. Of the 2-party customers interviewed, 20 per cent were considering an upgrade. There are

six and a half million residence 4-party and nine and a half million residence 2-party customers in the Bell System today.



The 1-type answering set, developed by the Bell Telephone Laboratories.



The Peatrophone, produced by an independent manufacturer.

The Customer Attitude Study might indicate, then, that there are almost four million party-line customers (including those on file) who are good prospects for sales effort in this market.

Where central office and outside plant conditions permit, the companies are telephoning these customers to suggest improved grades of service. Indiana, for example, recently sold better grade of service to 57 per cent of some 1,500 customers interviewed. Five other companies report sales success ranging from 25 per cent to 65 per cent.

Here again there are values to be counted over and beyond the additional revenues gained. More customers have the service they want—with increased privacy and availability. More customers can make and receive calls at their convenience and fewer calls are abandoned because the line is busy.

Improved grades of service also give the Companies a hedge against the future. Telephone people who sold during the great depression recall vividly that one- and two-party customers who felt a budget cut was necessary for economic or psychological reasons could and did take a lower grade of service. Four-party customers had no place to go, and many discontinued service.

Extension Service a Good Buy

FOR WELL OVER A YEAR, NOW, the companies have been suggesting extension telephones to their customers, generally limiting their efforts to those cases where an installer's visit is necessary for other reasons—such as a new connect, a removal to a new address, or a move or change at the same address. Business Office representatives, Sales and Servicing representatives and, in many companies, Plant installers,

have joined in this effort. The companies report considerable success in this field.

While the number of extensions per 100 residence main telephones for the System increased from 11 per cent in 1951 to 12 per cent in 1953, the residence extension market still unsold is of great interest to the companies. If, for example, residence extension development in the Bell System were at 15 per cent, 700,000 more extensions would be in service, and 20 per cent development would mean 2,000,000 more extensions. It is significant that nine areas are now at or above 15 per cent and two are above 20 per cent. Seventeen are at or above the system average of 12 per cent, while the balance of the areas (41) range from 11 per cent to five per cent.

The ease and convenience of improved telephone coverage in the home, the saving of steps, the value of extension service in sickness and emergencies, and the fact that extensions cost but a few cents a day make this service a most attractive "buy" for our customers. Moreover, the increase in number of calls originated because they are easier to make and the increase in calls completed are benefits derived by the companies in addition to the revenues for the extensions and the increased number of satisfied customers.

Servicing the Business Market

IN THE MID-1930's, 85 per cent of our business market coverage was scheduled. That is, the companies initiated interviews with customers to review existing telephone arrangements and to suggest additional or changed facilities and services as appropriate. Recently only 10 per cent of the calls on customers in this field have been scheduled: 90 per cent were the result of customer initiative. In the past, shortage of



A hand telephone equipped with shoulder rest frees the user's hands for other things.

facilities, the sheer volume of customer requests, and the relative inexperience of a good share of the servicing personnel have caused the companies to feel that full advantage of these opportunities to review customers' communication needs was not being taken in enough cases. Now that conditions have changed, the companies are capitalizing on both the demand and the increased number of scheduled contacts. This, coupled with the companies' efforts to strengthen their Sales and Servicing forces, has already resulted in a more complete sales and servicing job in this market.

While business exchange customers represent only 15 per cent of the Bell System's total accounts, they contribute substantially to total revenues. The value and importance of this market is well appreciated by the companies. Recent efforts with

some of our P.B.X. accounts—some of whom used privately-owned P.B.X.'s for interior communications—resulted in the furnishing of integrated systems with interior exchange, and long distance requirements met through the one P.B.X. switching equipment, leased from the telephone company. For each man-day of servicing time devoted to these cases, annual exchange revenue ranging from \$100 to almost \$1,000 was developed. In six other cases, not involving privately-owned facilities, annual exchange revenue increases per servicing man day averaged \$230. So you see, complete servicing pays off.

In the non-P.B.X. business market, representing 3,350,000 customers, the switching equipment used is by no means as spectacular as in the P.B.X. field. Key equipments, however, are very popular. Additional line requirements, extension

services, and additional listings also present attractive sales opportunities to the companies and contribute substantially to the efficiency of small business operations. The Ohio Bell Company's Northeastern Area recently recorded data on "scheduled" efforts on a small sample of this market which indicated that annual revenue potential as high as \$100 per man-day might be possible through effective sales attention.

New Items in the "Line"

HOW MANY CUSTOMERS KNOW that we have over 400 items in our communications "line"? Not many, I'd guess, and still fewer

know about important additions the Bell Laboratories and our engineers are constantly making available to extend further the value of telephone service. Such newcomers to our line as our automatic answering and recording service, for example, offer our sales forces an invaluable chance to fill a customer's need for "out of hour" or "out of the office" telephone coverage. "Answering only" service, shoulder rests, "hands free" distant talking, loud-speaking telephones, concentrator-identifier equipment to permit secretarial bureaus to serve remote central office areas, improved secretarial switchboards, telephones with illuminated dials, and two-

A telephone with built-in lamp illuminates the dial when the hand set is lifted from its cradle.





Long Distance Rates Are Low. These are the *daytime* station-to-station rates for the first three minutes and do not include federal excise tax. Long Distance rates are even lower after six every evening and all day Sunday.

You save days and dollars
when you go **Long Distance**

There is hardly any limit to the time, money and waste motion Long Distance telephone service can save in a single business day.

Here are only a few of many things you can do by telephone: Make appointments to avoid fruitless visits. Complete sales with new contacts or old customers

Make purchases at advantageous prices or when emergencies arise. Satisfy complaints promptly and personally. Make collections by diplomatic, friendly discussions of overdue accounts.

Many companies have found that a small investment in Long Distance pays big dividends

Long Distance Doesn't Cost—It Pays.

We have some specific suggestions for the profitable use of Long Distance in Sales, Purchasing, Administration, Traffic, Production, Engineering and Accounting. If you would like to discuss them, just call your Bell Telephone Business Office

BELL TELEPHONE SYSTEM



The speed and low cost of long distance service is being stressed in magazine, newspaper, radio, and television advertising.

tone and full color telephone sets—all these and other new items are now in the line or expected before the end of this year.

Sales Through Advertising

ALL THESE ACTIVITIES are being supported in strength by our advertising people throughout the System. TV and Radio as well as newspaper and magazine advertising are being used selectively and as appropriate to get our sales story before the public. Employee magazines and other periodicals are at the same time reminding all our people that "Sales is in the air." Brochures and other sales aids are benefiting by the attention and the talent of these same people. Displays and exhibits of a promotional nature are being made to order. It's typical of Bell System people that those positive promotional activities are approached with great enthusiasm and zest. Persuading a customer that our service meets his need at a price commensurate with its value is a lot more fun than explaining delays and shortages.

You Too Can Sell

PERHAPS THERE IS A LESSON in this human reaction. All of us telephone employees

can and should sell our business at every opportunity, just as we have been helping to make customers understand delays in furnishing any service or the right kind of service, the need for rate increases, and other non-promotional programs. Now we can support the sales job in strength. The simple question to a friend or neighbor "Why don't you call them on the telephone" may save an unnecessary trip—or an undue delay through correspondence. More important still, it may encourage in the customer a habit of getting the most out of his telephone and engender an even greater realization of its value to him. Does someone you know need extension service, additional listings—any of our other service items? He will expect you to tell him about them—just as you would expect your non-telephone friends to mention new, improved, or particularly appropriate features of their business offerings to you.

You are all welcome to join the Sales and Servicing team. And you may be surprised to know that the sales experts think of you as just about the most effective salesmen there are. You find this hard to believe? Just ask the next Bell salesman you meet!



Mrs. Mildred Lothrop presents her Vail medals to E. H. Schafersman, president of Casper E. Yost Chapter, for the Telephone Pioneers of America.

Only Holder of Two Gold Vail Medals:

MRS. MILDRED LOTHROP

THE ONLY PERSON, man or woman, ever to receive two gold Vail medals—highest award bestowed by the National Committee of Award—is Mrs. Mildred Lothrop. Now retired on pension from the Northwestern Bell Telephone Company, she presented the medals last Fall to Casper E. Yost Chapter, Telephone Pioneers of America.

The outstanding deeds of public service for which Mrs. Lothrop was honored were remarkable in that, although they took place almost exactly twenty years apart, they were practically identical in kind and circumstance.

The first was on June 1, 1920. A cloud-burst caused Omaha Creek to overflow its

banks and send a wall of water ten feet high through the village of Homer, Neb. Mrs. Lothrop remained at the switchboard and called every customer in the valley to give warning of the fast-rising flood. Thanks to her, many heroic rescues were effected and not a life was lost. Only when the equipment went dead did she leave her switchboard.

A similar disaster struck Homer again on June 4, 1940, when Omaha Creek went berserk once more. Four lives were lost in Homer and eight in Winnebago, nearby. Once more Mrs. Lothrop stuck to her switchboard, warning people to flee to the hills and directing men in boats to people marooned in their homes. Only when the

building was shaking with the rush of water did she descend mud-covered stairs to rescuers who carried her to safety.

Retired since 1942, and now 77 years old, Mrs. Lothrop has been wondering what to do with her treasured medals. As she put it, "I know my children and grandchildren appreciate the significance of the medals. But what about future generations? I decided I'd rather have the

awards in some place where they'd surely be held in esteem for a long time to come. That's why I decided to present them to my fellow Telephone Pioneers in Casper E. Yost Chapter." And that is what Mrs. Lothrop did, in a ceremony in Omaha last October.

Mrs. Lothrop still lives in Homer, where she is one of the village's best known and best loved citizens.

"THIRTY YEARS AGO TONIGHT"

Telephone Story on the TELEPHONE HOUR Radio Program

JUST THIRTY YEARS AGO tonight, at just about this time, one man's voice was heard over the radio in New York and California *at one and the very same instant*. Such a thing had never happened before.

Yes, February 8, 1924, was the date of the very first coast-to-coast radio network broadcast. The voice, fittingly enough, was that of a telephone man: John J. Carty. He was Chief Engineer of the American Telephone and Telegraph Company during the development of the transcontinental telephone network, and he was constantly working to extend its usefulness in many ways.

Mr. Carty spoke from Chicago's station WMAQ. Special equipment was used to carry his voice over telephone wires to New York, Providence, R. I., Washington, D. C., and Havana, Cuba, in the East, and westward to Oakland and San Francisco in California.

How that first network has grown! Tonight 199 stations, including WMAQ, are linked together to bring The Telephone Hour to you. And this is only one of many radio networks whose stations are interconnected by the Bell Telephone System.

Today, too, millions of homes enjoy tele-

vision programs brought to their local stations on Bell System facilities. This is a job that calls for a great amount of complex, specially designed equipment. The sensitive signals must be kept in precise electronic balance as they are switched across the country—flashing over the coaxial cables and radio-relay channels built to provide the nation with long distance telephone service.

The long distance telephone network itself has grown tremendously in the last thirty years. It reaches out to every corner of the land. The service is dependable and fast. And its cost is low. You and your neighbors are using it more and more every year for your business and personal affairs.

When you think about it, you realize how a great communications network like this not only speeds the vital messages of government and business, but carries your own warm words to distant relatives and friends. The same network also brings us together in radio and television audiences to hear and see historic words and great events. Truly, the long distance network unites us all in our living Democracy.

HEADQUARTERS SUMMARY

January 1 to
March 15, 1954

A TRANSISTORIZED carrier telephone system for use on rural lines has been undergoing development field trials in Americus, Ga., since the second week in February. The system is being designed to furnish up to four carrier circuits on a pair in addition to the voice-frequency circuit. It will operate over normal rural lines, and will employ repeaters where necessary. A total of 12 channels (24 terminals) will be used in the trial. The first 3 channels have been assembled by the Laboratories and the remaining 9 channels will be assembled by the Western Electric Company. Use of transistors is expected to simplify the power-supply problem and reduce the physical size of the carrier equipment. It is expected that the new carrier system will be ready for shipment on a regular basis sometime next year.

IN SEVERAL CITIES, experiments with two-letter central office abbreviations in customer directory listings (CR 3-1234 for CRestview 3-1234, for example) have been concluded. The results indicate that the new plan has had no adverse effect to date on customer dialing accuracy nor on the handling of toll calls in these cases. More than a score of books are employing the new style (for the second issue in 3 cases) while other directories are scheduled for conversion this year. Although the use of two-letter abbreviations has thus far been restricted to books containing six or less central office names, experiments with books containing 10 to 15 central office names are planned—with further experiment in larger books if results of such trials are satisfactory. Substantial savings can be obtained in this way. Still unsolved, however, are the problems as to application in the largest areas and the ultimate effects of customers using two letters in placing toll calls.

FOR THE NINTH CONSECUTIVE YEAR, on-the-job safety results improved again in 1953. The improvement last year was due almost entirely to better safety results among women employees. Lost-time injuries per 1000 women dropped 13% to 1.76, bringing their injury rate below that for men. For a number of years women's injury rate had been substantially higher than men's. Men's rate, 1.86, showed only very slight change from a year earlier.

While the safety results published by the National Safety Council continue to show that telephone work is more than five times safer than the average industry, there has been an increase in fatalities during recent years. This unfavorable trend has been due largely to an increase in motor vehicle cases. Telephone people will not be satisfied until ways and means have been found to eliminate all such unfortunate accidents.

Lost time injuries per 1000 employees:

	1944	1950	1951	1952	1953
Men	4.90	1.91	1.94	1.87	1.86
Women	7.39	3.99	2.91	2.02	1.76
Total	6.71	3.26	2.58	1.97	1.79
No. Fatalities	8	12	8	13	14

USE OF BELL SYSTEM PATENTS without the payment of royalties has been offered to the manufacturers of hearing aids by the Western Electric Company, manufacturing and supply branch of the Bell System, which handles patent licensing for the System. The offer includes royalty-free use of the transistor, the tiny, rugged electronic device invented at Bell Telephone Laboratories which can do most of the things an electron tube can do—and on a fraction of the power.

DURING THE FIRST QUARTER OF 1954, the Treasury people at headquarters who handle the stock transfer, dividend, and related services for share owners have moved to their new home at 50 Varick Street—about a ten-minute trip on subway or bus from 195 Broadway and near Long Lines headquarters. This move to enlarged quarters became necessary because of the tremendous growth in share owners since the war. The new building was first used for the 1952 convertible debenture issue, after which it was purchased and remodeled in time for the 1953 issue. The people handling this work, totaling over 300 regular Treasury employees, will occupy the major portion of the three lower floors and basement in the new building, comprising about 75,000 square feet. The record of A T & T stock ownership, which is maintained on ledger cards and is known as the "stock book," now has a

unified and commodious lay-out of 30,000 square feet in the new building.

AN INTERDEPARTMENTAL Clerical Operations Committee, organized at 195 Broadway and working with Bell System companies, is seeking to develop means of eliminating duplication, to simplify manual procedures, and to apply mechanization where practicable. Interdepartmental committees have been formed in the Michigan Bell Telephone Company, The Bell Telephone Company of Pennsylvania, the Wisconsin Telephone Company, the New York Telephone Company, and the New England Telephone and Telegraph Company. The Michigan committee is analyzing clerical work in the field of facilities engineering; Pennsylvania is studying the field of test center operations; Wisconsin is making a survey of time reporting, payrolls, and personnel records; and New York is studying the field of operating results and allied reports.

THE FIRST TRANSMISSION from the west coast of the newly approved (by F.C.C.) color television system, took place on New Year's Day with the NBC telecast in color of the Tournament of Roses parade at Pasadena, Cal. This program was carried over Bell System transcontinental radio relay facilities to TV broadcasting stations in 18 cities coast to coast, including five on the eastern seaboard. The program was also carried in black and white in other areas. Favorable comment was received in the press for the over-all accomplishment. For the transmission of color, special adjustments are made and supplementary apparatus is added to the channels regularly provided by the Bell System for monochrome transmission.

MANUFACTURE OF THE REPEATERS to be used in the transatlantic telephone cable was started in January. Surveying of the radio relay route which will carry the system from Portland, Me., to Sydney Mines, Nova Scotia, was undertaken in February.

PLANS HAVE BEEN FILED by the Long Lines Department to construct a radio relay route more than 1,000 miles across the Southwest to transmit telephone conversations between Amarillo, Tex., and Los Angeles, and, for the present, television on parts of the route. Construction of the system will be undertaken in three steps. Initially, two westbound video

channels will be provided between Amarillo and Albuquerque, N. M., to be ready for service by late summer. The next section will involve the building of an east-bound channel from Los Angeles to a point near Baker, Calif., to provide network television service to Las Vegas, Nevada, by next fall. (The main route of the system passes south of Las Vegas but interconnection is to be established by constructing a side leg from a point near Baker to Las Vegas.) The final section between Baker and Albuquerque will be built at some future date.

The first section of a radio relay route that starts at Atlanta and which will ultimately extend to Dallas was completed as far as Montgomery, Ala., early in March. The next section, which will extend to Jackson, Miss., is scheduled for operation in June. These channels are to be used for the expansion of network television in Georgia, Alabama, and Mississippi. A new horn-type antenna will be introduced on the Dallas-Jackson section of this route.

AS PART OF the broad program of continent-wide toll dialing by both operators and customers, the Laboratories have re-designed a single-frequency signaling system which is less expensive to produce and easier to maintain. A tone in the audible range can be sent over the same channel used to carry the customer's conversation, which method is therefore more efficient than those requiring extra channels for dialing and supervisory purposes.

A DESK-SET TYPE of telephone for use in areas where explosive gases may be present has been developed at the Laboratories to supplement the similar telephones designed for wall or pedestal mounting. It meets the requirements of the National Electric Code and Underwriters Laboratories for most hazardous areas.

NIKE IS THE NATION'S first ground-to-air guided missile system which is ready for combat, and word was released recently that New York, Chicago, Boston, Los Angeles, and Norfolk will soon be defended by Nike batteries. A previous Army announcement stated that the first Nike installation had already been set up at Fort Meade, Md., between Baltimore and Washington. Nike's elaborate electronic system for automatically guiding the missile to intercept and destroy the target was designed

Headquarters Summary

by Bell Laboratories and is being produced by Western Electric.

WORK IS PROCEEDING ON construction of Western Electric's new Merrimack Valley plant at North Andover, Mass. When completed, in the spring of 1955, the plant will consist of a two-story administration building linked to a two-level factory, encompassing 875,000 square feet. Products will include coils, resistances, transformers, filters, and networks for telephone equipment.



READERS OF previous issues of this MAGAZINE will find some changes in this one—albeit nothing really radical.

Most obvious is the cover, which for the first time in a third of a century bears a picture. It is a reproduction of an original etching which was executed for the MAGAZINE by Douglas Gorsline, an American artist whose works hang in many galleries and museums and have won numerous awards. Specifically, his etchings have won—among others—the Arms and Shope prizes in the annual exhibitions of the Society of American Etchers and Gravers and first prize in the Library of Congress annual show; and he was chosen in 1947 to execute the annual Presentation Print of the Society of American Etchers and Gravers. He is also an author and illustrator, having recently published "What People Wore," an exhaustive history of costumes through the ages, and he is at work on a new volume, "The Appearance and Dress of Americans, 1840–1899." Mr. Gorsline visited several business offices before choosing the particular record office shown on our cover in which to depict the Commercial Service Representative and the essential contributions she makes to the satisfaction of her customers and to the success of Bell System service.

AN ETCHING, incidentally, is a rather specialized art form. The word comes from the Dutch *etzen*, to eat, and the process of "eating" a drawing developed out of the decorative methods of medieval armorers. These craftsmen discovered that they could etch de-

signs into the metal surface of armor by the "bite" of acid. Artists found that, by rubbing ink into the lines of the design, overlaying a sheet of paper, and then applying pressure, they might obtain a reproduction of the lines. Today, etchers control the lines to be etched by rolling onto a copper plate a thin film of wax, scratching the design in reverse into the wax with a fine needle, and then immersing the plate in a nitric-acid bath. The acid eats away only the exposed lines in the copper plate. Removed from the acid, the wax film is washed off; then the ink is rubbed *into* the etched lines and *off* the plate's smooth surface; and, finally, dampened paper is laid over the plate and both are run through a roller press. It is a subtle process, one of infinite detail, and the result is an original print—etching—such as Mr. Gorsline has produced for us. What we have on the cover represents one further step, of course: a mechanical reproduction in quantities far greater than could be struck one at a time from the original plate. Such a reproduction, without lettering and suitable for framing, will be sent without charge to any telephone man or woman who cares to ask the editor for it.

signs into the metal surface of armor by the "bite" of acid. Artists found that, by rubbing ink into the lines of the design, overlaying a sheet of paper, and then applying pressure, they might obtain a reproduction of the lines. Today, etchers control the lines to be etched by rolling onto a copper plate a thin film of wax, scratching the design in reverse into the wax with a fine needle, and then immersing the plate in a nitric-acid bath. The acid eats away only the exposed lines in the copper plate. Removed from the acid, the wax film is washed off; then the ink is rubbed *into* the etched lines and *off* the plate's smooth surface; and, finally, dampened paper is laid over the plate and both are run through a roller press. It is a subtle process, one of infinite detail, and the result is an original print—etching—such as Mr. Gorsline has produced for us. What we have on the cover represents one further step, of course: a mechanical reproduction in quantities far greater than could be struck one at a time from the original plate. Such a reproduction, without lettering and suitable for framing, will be sent without charge to any telephone man or woman who cares to ask the editor for it.

"FORMAT" is a rather general word describing what makes a book or publication look the way it does. "Get-up" is a dictionary synonym. George Salter is responsible for our present appearance—*format*—including design, hand lettering, page layout, and choice of types. A refugee from Hitler's Berlin, he has established himself as one of this country's leading designers, calligraphers, and typographers, and examples of his skill and craft may be found on the shelves of book stores from coast to coast.

His type selections blend old and new faces, as good type design makes possible. These words you are reading are set in Lino-

type *Caledonia*, a face designed some 20 years ago by W. A. Dwiggins to add "liveliness in action" to the staid readability of the *Scotch Modern* face. *Bulmer* is the name of the lovely type in which the headlines are set by hand. It was originally designed by William Martin in 1795, and was recut by Morris Benton in 1923.

AS FOR THE EDITORIAL CONTENT: changes here are least apparent. A new note of informality, such as this; a summing up of Headquarters happenings for quick review, while recognizing that a quarterly publication cannot well be a news medium; perhaps more significant discussion of policy and practice from time to time; more and better illustrations, even though this is a *read* and not a *look* publication. If change is likewise improvement here, it will not be spectacular but only gradual. The purpose remains basically what it always has been—and as it is now defined on page one.

BUT WHY ALL THIS? What was the matter, you may ask, with our recent pattern—our previous format?

Nothing, really. It had been professionally designed. It served well for a dozen years. And yet there were two clear reasons for the changes.

This business is not the same as it was a dozen years ago. The extent of its growth, its progress, needs no recounting here. And this MAGAZINE, as one unit within the Bell System and a representative of it to other businesses here and abroad, tries to be in the van. These changes, moreover, enable us to incorporate most of the suggestions—the practicable ones, at any rate—which many of our readers have been kind enough to offer us in recent years. To them, as we start the thirty-third volume of this "Medium of Suggestion and Record of Progress," we express our appreciation.

THE SYMBOLIC FIGURE which has surmounted the Headquarters building at 195 Broadway in New York since 1916 has become familiar to millions of people not only through his eminent visibility 434 feet above the street but because he has been reproduced so many times and in so many places—notably on



millions of telephone directories. He has been called many names, including—among the printable ones—*The Spirit of Communication* and *The Bell System Rasslin' with Red Tape*, but his proper title is *The Genius of Electricity*. He was designed by Miss Evelyn Beatrice Longman, who won with him a competition in which eight sculptors participated. Because he appears to represent in a single symbol the focus of the Bell System, he has been used for many years and in many ways in this MAGAZINE—and continues to be in the new format. It seems appropriate, therefore, to make regretful note here of the death on March 10, 1954, of his sculptor, whose married name was Mrs. Nathaniel H. Batchelder.

THERE IS RISK of being repetitious, of course, in quoting so widely read a magazine as the *Reader's Digest*; but those who saw Frederic Sondern Jr.'s article in last January's issue will forgive us, we trust, if we bring to those who have not seen it this fragment of a report from a prisoner-of-war camp in Korea:

A Chinese Communist was lecturing on "maltreatment of labor in the United States." In the Soviet Union and the People's Republic of China, he said, it was the competent worker rather than the management official who was honored and elevated. He called on an American sergeant to make appropriate comments.

"Well, I don't know," said the sergeant, stroking his chin. "At home I work for the telephone company. All the big men in it came up from the ranks—linemen and such. Seems to me that they're the Labor Heroes. Happens that I'm a stockholder in the company. It pays good money. Don't see that I've got any complaints."

The topic of labor was never touched again in that particular class.

FROM that same far side of the world also came, not long ago, a chatty letter from a young Japanese who had recently gone to work for Nippon Telephone and Telegraph Corporation. After describing changes in telephone practices since the war, and his own problems in adapting himself to the requirements of the new job, he continues: "In anticipating good future, we periodically hold introspection conference on any subject we have done, are doing, will do, or may confront with, in a placid atmosphere, sometimes funning at one another or pointing out broadly any one's faults mutually." . . . Well, the Japs are known as great imitators.



World statistician: Elizabeth Wrenshall

Who's Who & What's What

(Continued from page 3)

charge of the Public Relations Department.

NOT ALL TALKS rate as well as the one we persuaded RALPH BOWN to commit to paper, and those who have heard him give it will credit him with—among other qualities—an excellent memory. Dr. Bown's career includes nearly 35 years with the Bell System. He was named assistant director of radio research of the Laboratories in 1934, director of radio and television research in 1936, and in 1944 was appointed assistant director of research. His most recent appointment is as vice president in charge of long range planning of Laboratories programs. Before his previous appointment as vice president in charge of research, he had served as director of research, succeeding in that post Dr. M. J. Kelly, now President of the Laboratories. Much of Dr. Bown's work has been concerned with various as-

pects of radio broadcasting and overseas telephony and radio relay. He was a division member and consultant of the National Defense Research Committee, specializing in radar, and in 1941 he visited England to study radar operations under combat conditions. He also served as expert consultant to the Secretary of War.

"TELEPHONES IN THE WORLD TODAY" is ELIZABETH WRENSHALL's fifth annual contribution to this MAGAZINE on matters statistical. A teacher in schools abroad before World War II, a translator for censorship authorities during that struggle, and a member of A. T. and T.'s Headquarters group since 1945, she finds her facility with foreign tongues a real asset in gathering and compiling data which she uses in her daily activities. Her last year's arti-

Sales authority: Justin J. Murphy



cle bore the title "The World's Top Countries—Telephone-Wise."

IT WAS JUST 25 years ago that JUSTIN J. MURPHY joined the New York Telephone Company—as a "non-user" salesman in the Bronx. After three months of vertical salesmanship ("up and down flight after flight of stairs," he explains), Mr. Murphy was transferred to a business office in the Bronx, and later held administrative responsibilities at district and division levels. Since 1951, he has been sales and

servicing engineer in the Commercial Division of A. T. and T.'s O. and E. Department. Here he encourages the efforts of sales people in Long Lines and the Associated Companies, takes constructive part in many System conferences, and attends industrial conventions of wide variety and national scope—all expounded in this article under the banner of *sales*. To this MAGAZINE for Spring 1952 Mr. Murphy contributed "Meeting the Service Needs of Service Men and Women."

OVER 81% of Bell System telephones are now dial. In recent years, as a means of improving service and meeting the requirements of increasing call volumes to points beyond the local calling area, the System has embarked on a program enabling the operator at the originating office, or the customer himself, to dial these calls. Currently, operators are completing about one-and-one-quarter billion such calls per year by dialing, while customers are dialing directly about 600 million such messages per year. By the end of next year, some 86% of System telephones are expected to be dial, and customer dialing to points beyond the local calling area is expected to pass the one billion annual message volume point. The ultimate objective is to develop an integrated local and toll switching and transmission system which will enable customers to dial "station-to-station" calls whether they be to neigh-

bors across the street or to distant points in the United States or Canada.

Most of the progress in long distance dialing is based on two major types of facilities developed by the Laboratories: the No. 4 type crossbar toll switching system now installed in 24 locations in the United States, with 39 by the end of next year and ultimately about 70; and automatic equipment for recording the necessary information for billing.

Tremendous amounts of engineering planning remain to accomplish full nation-wide customer dialing. This is illustrated by two of the many fields of endeavor: placing all telephones on a universal two-letter-five-numeral basis; and assisting the independent telephone companies in developing their plans so that they will work into the Bell System's integrated network.

INDEX NOW AVAILABLE

An Index to Volume XXXII (1953) of the Bell Telephone Magazine may be obtained without charge upon request to the Public Relations Department, American Telephone and Telegraph Company, 195 Broadway, New York 7, N. Y.

Bell Telephone MAGAZINE

SUMMER 1954



VOICES WITH A SMILE: Operators at a D.S.A. switchboard



VOLUME XXXIII

NUMBER TWO

SUMMER 1954

Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.



A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: "Voices with a Smile: Operators at a D.S.A. Switchboard." From an original etching executed for this MAGAZINE

Federico Castellon

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JUDSON S. BRADLEY, *Editor*

Published for the Bell System by the Public Relations Department, American Telephone and Telegraph Company, 195 Broadway, New York 7, N. Y.

CLEO F. CRAIG, *President*

S. WHITNEY LONDON, *Secretary*

JOHN J. SCANLON, *Treasurer*

BELL, *the Inventor*, and VAIL, *the Builder*

Painted by Dean Cornwell for the New England Telephone and Telegraph Company

The Alexander Graham Bell portrait shows the inventor at the age of 29, in his attic workshop at 109 Court Street, Boston, contemplating his first telephone. On June 3, 1875, this instrument first sent human voice sounds over a wire. Details of the painting were developed from sketches provided by the late Thomas A. Watson, Dr. Bell's assistant in the early telephone tests.

Bell was, first of all, a humanitarian. He once said that he would prefer above all else to be remembered as a teacher of the deaf.

And the deaf were his first concern nearly all his life. When he was not teaching them, he was establishing societies and institutions to aid them, or was compiling and studying statistics of the genetics of deafness. But he had many other interests as well. In later years, he found time to support and develop aviation, and to make important experiments in sheep breeding. A water-skimming boat to which he devoted attention during World War I has quite recently been found worthy of further development by the Navy.



ALEXANDER GRAHAM BELL



THEODORE N. VAIL

The portrait of Vail shows him in the chair he used as first president of the New England Telephone and Telegraph Company and later as president of the American Telephone and Telegraph Company.

Vail, the builder, holds blueprints of an expanding telephone system, while the globe represents his goal of world-wide communications. A large man, often brusque in manner, he was the central figure in two crucial periods of telephone history: the early years and the start of the era of nation-wide service.

His activity and force for a time blinded people to his wide vision and his essential kindness. He brought to Company reports and advertising a frankness that startled his own generation but is taken for granted today. When someone once questioned the advisability of issuing a public statement on a subject then regarded as touchy, he is said to have replied, "If it's true, let's be first to say it."

Under his sponsorship the Bell companies launched their first pension and benefit plans, January 1, 1913. And it was a memorandum of his pointing out the many acts of heroism and of devotion to service on the part of telephone people that led in 1920 to establishment of the Theodore N. Vail medal awards as a memorial to him.

These recent portraits of Bell and Vail, by Dean Cornwell, hang in the Directors' Room of the New England Telephone and Telegraph Company, in Boston. They are outstanding examples of modern portraiture, and are companions in style to Cornwell's mural, "Telephone Men and Women at Work," which is displayed in the lobby of the New England Company's long distance center at 185 Franklin Street. They are reproduced here, by courtesy of that Company, for their historical accuracy and their colorful interest to all telephone people.

COURTESY: ONE OF OUR GREATEST ASSETS

HAL S. DUMAS

Executive Vice President, A. T. & T. CO.

FROM THE VERY EARLY DAYS of our business, telephone men and women have recognized that courtesy is an invaluable element in getting along with those we serve. Perhaps the practice of courtesy started as a matter of necessity because of the very nature of the activity in which our first predecessors were engaged.

Until the telephone came along, people dealt with each other either face to face or by letter. When we speak face to face, a pleasant expression or a friendly gesture goes a long way to create good will. When we write, we instinctively take pains to make our words courteous and acceptable. The telephone, the new medium of communication, lacked the long familiarity and usage that had smoothed the way in writing and in face-to-face conversation.

It seems quite sure that the first days of telephone conversation were pretty rough as far as their courtesy content was concerned. It must then have become evident to all telephone people that, if their business was to grow and prosper and become truly useful, they themselves must set the pattern of patience and courtesy.

In the intervening years, courtesy became a habit with telephone people, and now it has become a matter of great personal pride with every one of us. The pub-

lic has come to look to us as the institution where they can always expect courtesy and consideration. The courtesy of telephone people has become the standard by which those who deal with the public in every line of endeavor are measured. We have won a proud place for ourselves in the eyes of the people of our country, a place which each of us should guard zealously in everything we do.

Here is part of a recent letter from one of our customers, who was also a new share owner:

"Not long ago I had the pleasure of visiting the telephone office here. We had been charged with out-of-town messages which we never made. I was amazed at the courtesy and coöperation the girl gave me. It was only a matter of minutes until the error was tracked down.

"This incident caused me to do some thinking. If all business of the vast A. T. & T. Company was carried on this way, I wanted to be a small part of it. In the near





future we plan again to invest some more of our savings with your company."

What a wonderful job that young telephone woman did for herself and her company! She not only turned dissatisfaction into pleasure but she made for all of us a fast friend, a substantial friend who immediately showed his friendship most convincingly by investing his money in our business.

The splendid spirit of courteous and helpful service shown by this young woman does not stand alone. It is this same spirit, this pride in ourselves and in the thing we do, that is the source of the many heroic actions of telephone men and women, both on and off the job, which fill the pages of our history. It is a tradition well established in our business that service to the public comes ahead of our own personal comfort or, in great emergencies, our fears. The operator who sends help to a faint cry of distress, the plant man who uses his first aid knowledge to help the victim of an accident, all who move swiftly and surely to restore service in times of great natural disasters, are responding to the tradition of "service above self."

As striking as are these truly heroic actions, it is perhaps a greater test of fortitude when, day in and day out, regardless of our own indispositions, we serve the public so they think well of us and our company. There are undoubtedly many

times when, for each of us, being courteous is difficult and trying. But it is the job we do every day, on every contact, that builds for us the firm esteem of the public without which we cannot well continue.

There was a time when almost every one of the public had a number of personal contacts every day with those who handled his calls. With the progress and efficiency which have brought such a large degree of mechanization to our business, this is no longer true. Some users of dial service may not come in direct contact with a telephone company representative for months on end.

Where once a subscriber had the fact that telephone people were fine, courteous, and helpful impressed upon him several times a day, he may now be impressed only by the speed and effectiveness of his service. And he may well attribute his good service wholly to the machines, and have a poor opinion of telephone people if his occasional contact with us is indifferent or unfriendly. If for no other reason, this should lead every one of us to try to make a friend for our business on every contact.

There is, however, another and more important reason. Our pride in ourselves and in the great public service of which each of us is a real ambassador should be always with us. The courtesy of telephone people has become a national standard, a national asset. Its continuation and strengthening is an opportunity each of us can gladly meet.



A discussion of the role of telecommunications in national defense, and of the preparations and capabilities of the Bell System for meeting its grave responsibilities

EMERGENCY MOBILIZATION AND THE BELL SYSTEM

I. INTRODUCTION

EUGENE J. McNEELY

Vice President, OPERATION AND ENGINEERING, A. T. & T. CO.

IN THE PRESENT GRAVE STATE of international affairs, it is appropriate that careful consideration be given to problems of national defense. Since the outbreak of hostilities in Korea, Bell System engineers have studied all major plant expansion with a view toward providing the greatest continuity of service possible with reasonable expenditures.

The System's multiplicity of nation-wide—even world-wide—facilities for instant voice communication places heavy responsibility on it in time of conflict. In addition to its vast networks of standard types of equipment and services, its special installations since 1945 for the Armed Forces have extended their effectiveness in three dimensions, and the signaling and warning arrangements it has originated and placed in operation for the Civil Defense organization have done much for the latter. What part the developmental activities of the Bell Telephone Laboratories and the manufacturing capacity of the Western

Electric Company play in national defense may not be recounted. They have, however, been substantial.

In each of the Bell System's Operating Companies there are people who—whatever their title—have the responsibility for insuring that the communication needs of military and CD (Civil Defense) organizations are fully met. This includes a corresponding responsibility for keeping appropriate people in each telephone company aware of the defense situations and of activities relating to defense problems. In high-level dealings with both organizations, the defense coördinator is often able to call on his store of telephone knowledge and experience for suggestions and solutions which contribute to the value of our services.

At System headquarters, in New York, there is an A. T. & T. defense engineer. His dealings are, as might be expected, largely with people in Washington. He regards defense, and the provision of com-

munications for it, from the national viewpoint. That includes, of course, a liaison function which unifies all defense communications for the protection of our country.

Telephone men and women necessarily work on more or less specialized jobs in thousands of places from border to border

and from coast to coast. It isn't easy to get the big picture. This article, dealing particularly with the mobilization and emergency uses of telecommunications, is written to illustrate how the units of the Bell System are united and ready, over that same wide area, to make their critical contribution to the security of our nation.

II. SURVIVAL AND RESTORATION OF COMMUNICATIONS

CHARLES M. MAPES and
COLE A. ARMSTRONG

Assistant Chief Engineer and Customer Equipment Engineer, A. T. & T. CO.

NOTE: The following article is based on material which was prepared by Mr. Mapes, Mr. Armstrong, and their associates, for use by Mr. Mapes in his oral discussion of "Telecommunications in Mobilization and Emergency" in Washington on June 9 before members of the Executive Departments of the Federal Government which are directly concerned with defense matters. His talk was illustrated by many illuminated charts shown upon a screen, only a few of which can be reproduced here. EDITOR.

THE TELEPHONE COMPANIES, Bell and Independent together, blanket the entire United States with a network of interconnecting telephone circuits. There are in service some 160,000,000 miles of wire in cities and towns, 40,000,000 miles of inter-city telephone circuits.

The telephone plant is so constructed that in general it is expected to survive a bombing very well in comparison with other construction.

Cities are underlaid with a close network of underground telephone cables with great numbers of pairs of wires which

would generally not be destroyed by an atomic bombing.

Most telephone buildings in cities are of unusually strong construction, and are expected generally to survive bombing better than the surrounding buildings.

Special arrangements have been made and others are now being made to minimize the likelihood of interruption of essential services in times of disaster.

Auxiliary power insures against interruption because of shut-down of commercial power.

Duplicate outlets can readily be ar-

ranged for important points to the extent desired.

The mobile radio stations of the telephone system can be used for immediate temporary service where needed. Other emergency radio telephone sets form a part of the telephone system's provision against interruption.

Over the years, the telephone companies have faced and overcome natural and man-made disasters of great variety and tremendous scope. They have a very large reservoir of trained men skilled in all aspects of plant work and used to quick action in emergencies. Large stocks of materials are available to these men, throughout a very large number of locations.

The companies, as part of their regular service provision, have developed plans for providing for the prompt restoration of essential lines and the rapid restoration of all service.

The network of intercity circuits has great flexibility to provide rerouting to maintain essential services in the event of destruction of certain sections of intercity routes.

Extensive traffic control organizations throughout the country are continually at work readjusting the routing of traffic to take care of local peak demands in emergencies.

Four Types of Plant

THE BELL SYSTEM has four major types of plant which are used to interconnect our cities.

The first is open wire. Here a single pair of conductors may carry one voice channel, or it may have carrier systems applied to it which will permit up to 16 channels per pair.

The second is ordinary types of cable, with multiple copper conductors which

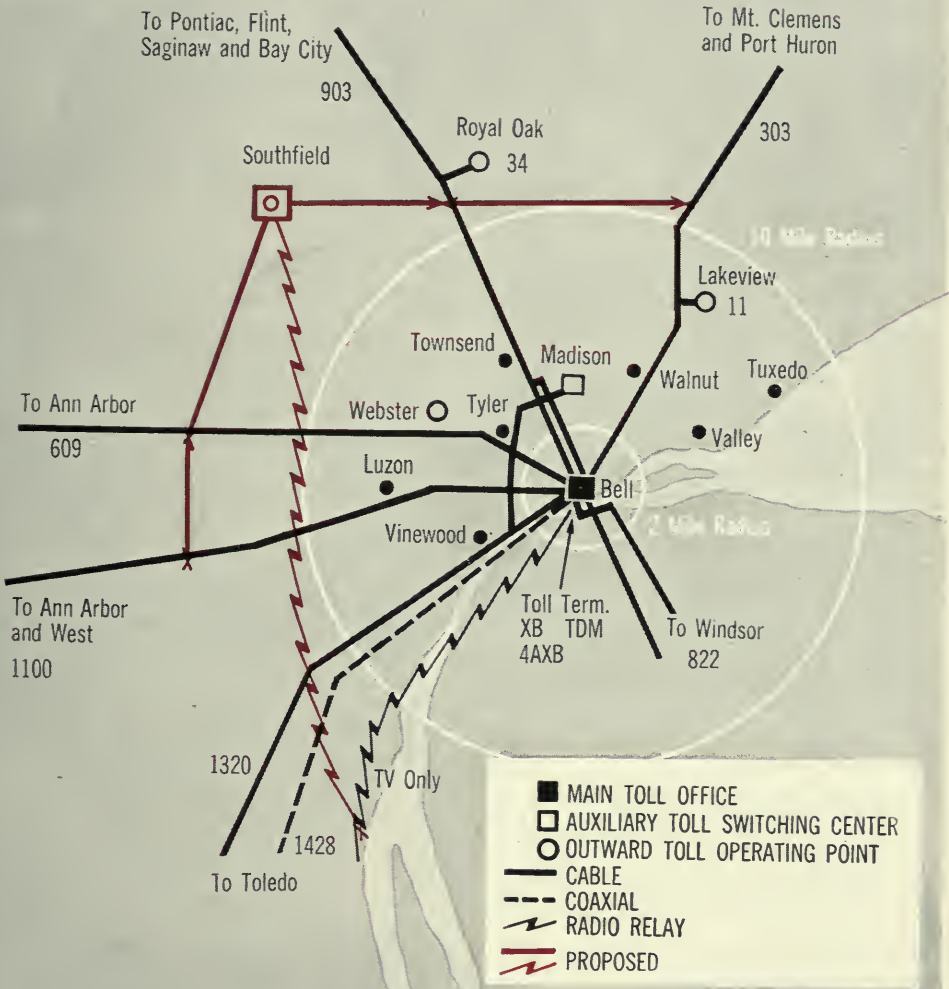
carry voice circuits on the individual pairs and which may also have carrier systems applied to them to produce up to 10 telephone channels per pair.

The third type is coaxial cable, which provides a center conductor with a concentric tube around it permitting transmission of large numbers of telephone circuits at one time. The usual coaxial cable has eight of these tubes, and our most recent design of carrier equipment for these cables makes it possible for each pair of tubes to handle 1800 telephone circuits. Normally, of the eight tubes comprising a complete cable, only six are used for regular service, the other two being retained for spare in case of trouble. A fully loaded coaxial cable will, therefore, handle 5,400 telephone circuits. Each pair of tubes can also carry two one-way television channels and 600 telephone circuits instead of the 1800 voice channels. For a complete cable you could have six one-way television channels—three in each direction plus 1800 telephone circuits, with two tubes held as spares to meet "trouble" conditions.

The fourth type is radio relay, which requires towers at intervals of about 30 miles for transmission of either voice circuits or television from city to city. These towers usually have four large rectangular antennas, two of which face in one direction and the other two in the opposite direction. These antennas focus the radio beams on similar antennas at the next station. One of each pair is the transmitting unit, the other the receiving unit. This radio relay system will at present handle 12 one-way broad-band communications channels, and provides for a total of 3,000 telephone circuits or 10 one-way television channels—with appropriate spare channels provided for "trouble" conditions.

These four types of telephone plant are

Principal Toll Cable Network DETROIT, MICHIGAN



New arrangements being provided for Detroit are typical of those being provided or planned in the large cities to increase the reliability of access to the rest of the country.

used, as appropriate, to provide the communications between cities of this country.

The Factor of Local Facilities

COMMUNICATING WITH A CITY depends also on the local facilities which are available, and the way in which intercity telephone calls reach their proper termination within a city is an integral part of the operation.

The city of Detroit, Mich., provides a typical example. There are a number of main routes coming into the city: six with ordinary cables, one coaxial cable on another route, and radio relay on the last route. The numbers of circuits on each route vary from 303 to 1428, with the radio relay system at present being used only for television; but rapid conversion to telephone is possible if that should be required. All of these facilities are terminated at two main offices in Detroit: the Madison office, to the north, and the main Bell building, at the center of the city. There are many local offices in the city which serve our telephone customers, and some of these are equipped with switchboards where operators handle outward intercity calls. A tremendous network of cable interconnects these local offices and the local offices to individual business and residence locations.

The Madison and Bell buildings, which are the present terminations of the major long distance circuits, are separated by about three miles, but they still could both be severely damaged by the type of nuclear attack which might be launched against the city. In order to guard against the loss of both of these offices and, by that, almost all of the long distance communications into Detroit, the Michigan Bell Telephone Company has decided to establish another switching center at the Southfield

central office, about 14 miles outside the downtown area.

This office will be connected to the intercity routes north and west of Detroit by an underground "ring" cable. Connections to the major intercity routes to the south will be by means of radio relay. The Southfield office will have automatic switching arrangements and trunks to reach the local offices. It is anticipated that by this arrangement a maximum of protection can be obtained both into and out of the city, in order to insure that, should Detroit be badly hit, it will still have communications with the rest of the country.

A new bomb-resistant building is now being constructed by the Michigan Company, and present plans call for completion of the dispersion arrangements by the middle of 1956.

Similar arrangements have already been made in Washington, D. C. There are five regular cable routes into the city, two coaxial routes, and three radio relay routes. As originally conceived, all of these routes would terminate either in the downtown switching center at 13th Street or at the uptown center near Dupont Circle. These offices would then feed the incoming calls to the local offices and collect outgoing calls from these offices for distant cities.

These two offices are within a distance of about two miles of each other and, in case of a successful attack on Washington, they both might be put out of service simultaneously. In order to guard against this happening and interrupting intercity telephone service in and out of Washington, the Chesapeake and Potomac Telephone Company began some time ago to provide for alternative arrangements.

Three dispersed switching centers have

Emergency Mobilization and the Bell System

been established, at Hyattsville, Silver Spring, and Arlington. These switching centers are on the main routes coming into Washington, and terminate approximately 25 percent of the intercity circuits entering and leaving the city. These switching centers have trunk facilities to the various offices in the metropolitan area. This is not a standby arrangement: *it is working daily*. In other words, 25 percent of the intercity traffic in and out of Washington is handled by these dispersed offices every day. Consequently, in case of an emergency no time would be required to put them into service.

Bypassing the Cities

NEW YORK CITY has also been handled in somewhat the same fashion. There are about 14 incoming routes, having circuit facilities ranging from 1,000 to 4,000 and carrying both through and terminating circuits. The total terminating circuits in New York City are about 11,000. New York has one large long distance office, and another smaller office about three miles uptown. New York is fortunate, in a way, that it has a large metropolitan center, Newark, fairly close to it. For since Newark has direct trunks to many of the New York City local offices, it in itself affords an amount of intercity dispersion which is quite helpful.

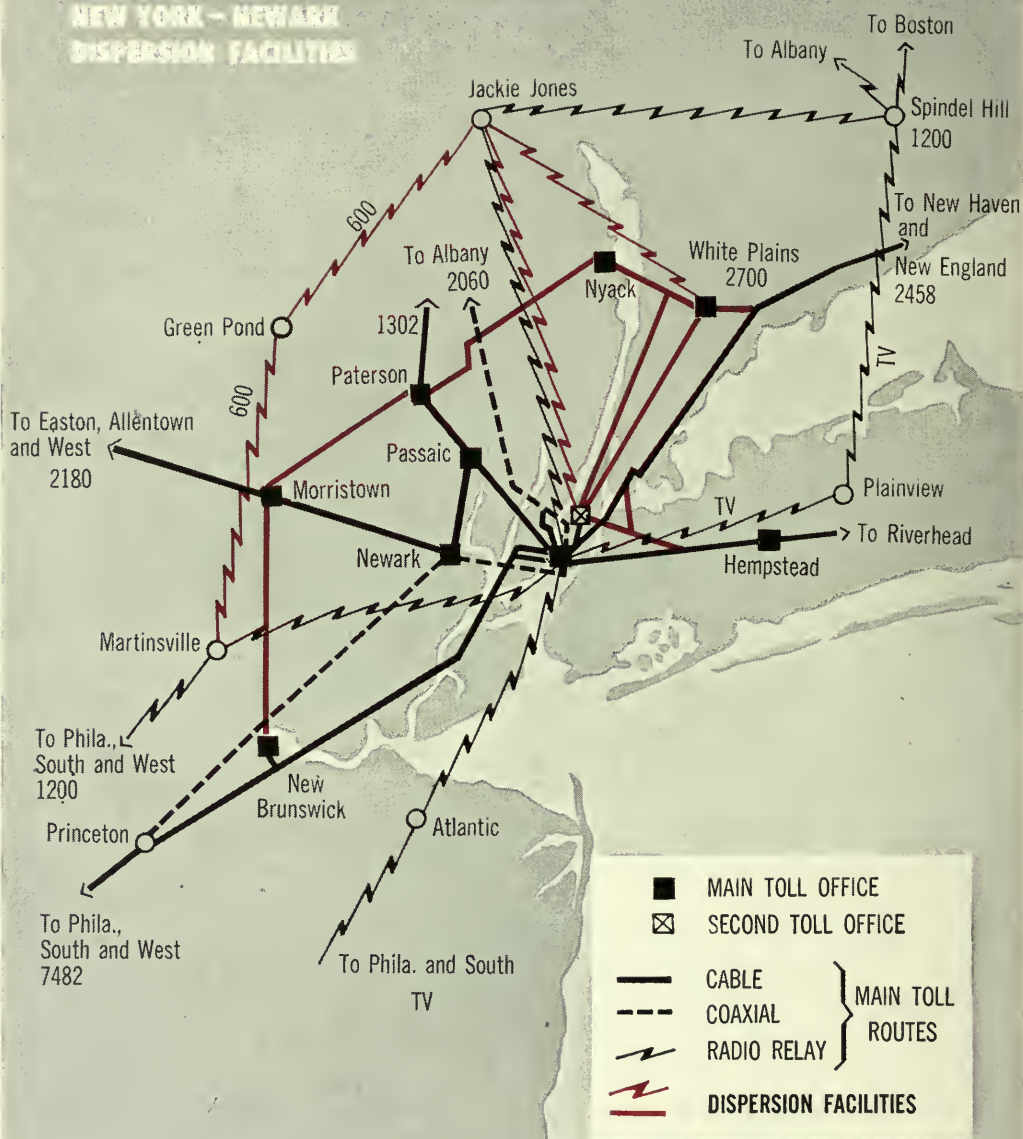
However, taking all factors into consideration, it seemed to the Bell System that additional protection should be afforded. Plans were initiated some years ago to establish a second long distance center outside New York City, at White Plains, which is about 23 miles north of Manhattan. The building for this center is complete and the equipment is being installed, to be in service toward the latter part of the year. It will serve about 2,700

L.D. trunks to most of the major toll switching points in the United States and Canada. It will also have a "ring" cable which goes across the Hudson at Tarrytown to the west for 12 miles and then south to Paterson and Newark, and also eastward to Stamford, Conn. This cable will afford connections to practically all of the main intercity routes into New York. It will provide continuous dispersed service for day-to-day traffic and, consequently, will not need activation in case of an emergency.

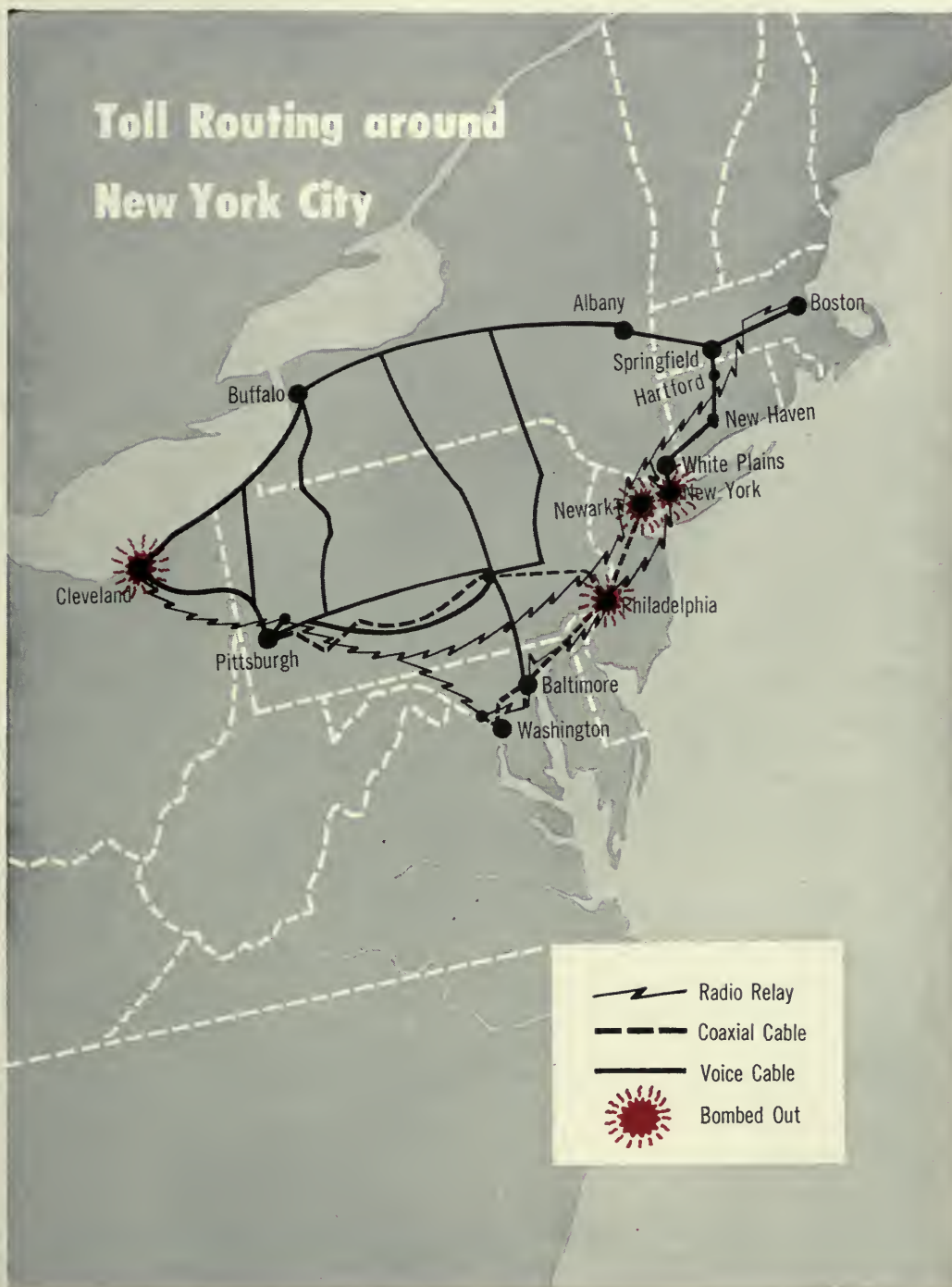
Incidentally, both the White Plains building, already built, and the Southfield (Detroit) building, now a-building, are constructed of reinforced concrete for the outer walls, the floors, and interior partitions, and with small window openings, to resist bomb damage. This type of construction is in accordance with the recommendations of the Federal Civil Defense Administration (FCDA).

One of the important considerations in the design of an intercity network is the ability to bypass possible damage in cities. Such a bypass arrangement is provided for New York. The radio relay link coming down from Boston has a tower about 35 miles from New York City, at Jackie Jones Mountain. This tower beams its radio energy at the downtown Manhattan building of the Long Lines Department. But facilities have also been provided and are in daily use to bypass the location in downtown Manhattan and go directly to another tower in north central New Jersey. This bypass is also in operation daily and does not need any special activation. When the White Plains dispersed center is in operation, about 25 per cent of the total daily traffic into and out of New York City will be handled at centers off Manhattan Island.

Main Toll Cable Routes

NEW YORK - NEWARK
NEWARK - PHILADELPHIA

Second long distance switching center and by-pass routes in the world's largest metropolitan area. Should New York City be bombed, the area still has access to intercity networks.



This partial picture of possible routes between Boston and Washington illustrates how several major intersections of a network can be destroyed without cutting off essential communications.

The matter of bypassing cities is of great importance. Yet, thanks to the Bell System network, bypassing loses some of its significance when it is realized that alternative routes in great variety are constantly available for communication between any two major points in the country. A typical example of routing around New York City would be for a call from Boston to Washington. The normal route might be from Boston to New York, Philadelphia, Baltimore, and Washington; but if something happens to New York, the alternative route via the radio relay towers 35 miles away from New York City might be used. Again, if another route is desired, it is possible to go from Boston to Albany, to Buffalo, to Cleveland, to Pittsburgh, and to Washington; or, there are routes from Syracuse to Harrisburg or other cross-country routes which can be used. These are smaller routes, of course, and would not be the primary bypass.

The important point in all of this is that, with vacuum tube repeaters, carrier systems, and modern transmission techniques, it is no longer necessary to depend on the size of a copper wire to get good voice communication. The question of longer distances requiring larger wires or special loading to get satisfactory transmission is no longer important. It is now possible to connect many links together of the type provided by basic carrier, coaxial, and radio relay systems, and get just as good transmission as would be expected from a single link of this kind. The Bell System uses this fact many times in its day-to-day operations to provide relief for congested traffic situations by alternative routes through longer but, at the moment, less used paths.

Major Long Distance Routes

SO FAR, we have talked about the major long distance routes feeding some of our important cities.

The nation-wide picture of the major long distance routes is on a vastly greater scale. There are seven transcontinental routes: four of them open wire; one of a cable equipped with the ordinary type of carrier; another of the coaxial cable type, along the southern route; and finally, a radio relay route spans the country from coast to coast. A major addition will be another radio relay route across the southern portion of the country, terminating at Los Angeles.

The total facilities which are available in the major routes throughout the country are many. Between East and West there are approximately 3,700 circuits working today. In some of the more congested areas, such as between New York and Philadelphia, there are 8,200 circuits working, and between Cleveland and Chicago over 4,400 circuits. Furthermore, the basic facilities on these major routes are such that additional circuits can be established quite quickly—since the cable or the radio relay towers are already constructed. For example, a radio relay system will handle 3,000 two-way telephone conversations when fully utilized. Only a small part of our existing radio relay systems is so loaded. Additional circuits on these routes require repeater and terminal equipment at the various points along the line, but do not require major construction.

In addition to micro-wave radio relay facilities, there are other radio systems which also afford substantial help in emergency conditions. The Bell System has available as stand-by equipment approximately 100 radio systems, scattered

Emergency Mobilization and the Bell System

throughout the country, which can be used in emergencies to bridge the gap which may have occurred in wire lines or cable as a result of some disaster. These facilities are of a single-channel variety, and will not now take care of multiple-circuit requirements. But the Bell System is currently adding to its emergency radio facilities with a new design of portable equipment which includes portable aluminum towers that can be erected within an hour at a spot where the toll circuits have been damaged, and the necessary radio equipment set up. Work is progressing to provide facilities which can make this single channel a multi-channel arrangement by the application of carrier equipment.

Another important feature in connection with emergency operations is mobile radio equipment. The Bell System provides service to 23,000 mobile stations. About half of those are private systems, and the balance connect to the regular commercial telephone network. These will provide a very important element in the work immediately after any substantial bomb damage to the larger cities of the country. Currently, facilities are provided in all but seven of the critical target areas designated by FCDA.

As is the case with cable construction, the time-consuming part of building a radio relay system is in getting the sites, building access roads and towers, and making an adequate power supply available. When this is done, the addition of circuits is reasonably simple and can be done quite quickly. As the intercity business of the Bell System expands and the needs of its special customers, such as the military forces, power companies, pipe lines, railroads, and others dictate the use of radio facilities, more and more of the

populated areas will have radio network possibilities.

Overseas Services

ANOTHER OF THE SERVICES which the Bell System provides is the overseas radio channels. Our part of the overseas communication job is to provide facilities for telephone service only. This is now done by radio circuits connecting the United States with various parts of the world through radio channels originating from transmitter and receiver sites near New York to the East, near Miami to the south, and near San Francisco to the west. Connection is made with the Army transmitters and receivers at Seattle for communications to the north. There are about 150 direct radio circuits, and they interconnect with other places on the various European, African, Asiatic, and South American continents.

Communications are available to most of the civilized world. Commercial service was opened in 1927, and has expanded substantially ever since. However, in spite of very great technical advances in the electronic art, the establishment of reliable communication to Europe by radio has not been completely successful, because magnetic storms do at times completely interfere with both voice and telegraph communication. A voice cable between the continents of America and Europe has been considered for many years, but it was not until recently that suitable techniques were developed to the degree which would make such a cable practicable. In the latter part of 1951 and early 1952, discussions were held with military and government people in this country, followed later by negotiations with the British Post Office and with the Canadian communications people looking toward the construction of such a cable. These



The tremendous diversity of routes and of types of facilities now in existence provides means of handling the essential traffic following all but the most devastating attacks. The extent to which additional protective measures are necessary is one of today's pressing questions.

negotiations were successful, and work on the technical details and the route has been begun.

As might be expected, the selection of the route was a most important part of the construction plans. The cable cannot go directly from the United States to England because of the inability to supply power from the two ends for the number of repeaters which would be required to get satisfactory transmission. Therefore, a stop at some intermediate point for power reasons is called for. There are two possibilities: to go from New York by way of Newfoundland to England or Scotland, or to go from New York by way of the Azores to England.

Consideration of all the many hazards involved led us to choose the route from Newfoundland to Scotland. It runs north of existing cables, but goes through a minimum of pack ice and misses most of the trawling grounds, and it is the shortest practical route.

The total length of the main link in this route is about 1,800 miles, and it is planned to lay two cables, one for transmission in each direction. These are to be started in 1955, with the laying completed in 1956 and service some time late in 1956 or early 1957.

The link from Newfoundland to Nova Scotia will also be of submarine cable; but from Nova Scotia on into Portland, Maine, it is planned to use the conventional type of radio relay system generally employed in this country. Initially, there will be 36 voice circuits in the cable, but we will, of course, be searching for ways and means to increase this number.

To provide adequate communications, it will be necessary to install underwater repeaters in the cable at intervals of about 40 miles. These repeaters will have three

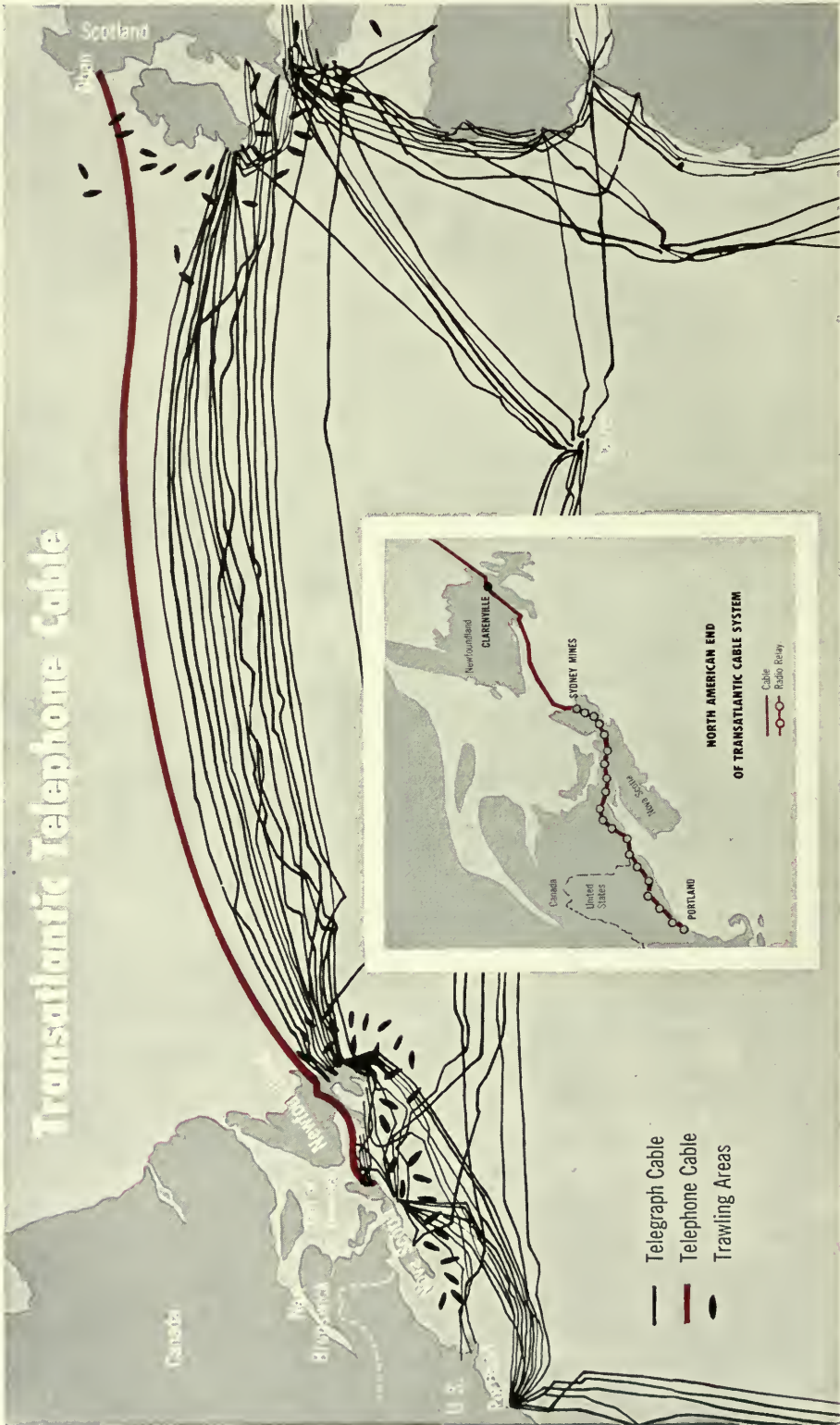
low-power vacuum tubes and will be of a character which will last for many years without attention. Such repeaters have been in operation in the Key West-Havana cable for four years, and so far no troubles have been encountered. Our aim is to design the cable to last for at least 20 years without attention due to defects in its manufacture, construction, or failure of its operating parts. Extensions to the rest of the continent will, of course, be possible.

"Operation Alert"

A WORD OF CAUTION may be necessary at this point. For if the most extensive type of attack which is visualized should occur, there would be serious interference with the intercity communications now established in this country. For example the exercise ("Operation Alert") recently carried out by the FCDA people assumed 46 bombs on 41 of the country's principal cities. This is a devastating attack, and the results of the exercise indicate that further action is required for the protection of communications. Many of these cities are on important Bell System long distance routes, and many of them would be interfered with, since ring cables, bypasses, or other protective measures are not available as yet in many of the major cities.

Ways of making arrangements for the protection of the important circuits through these cities are known, and will be discussed with the military people and other government agencies in an effort to arrive at the best conclusion as to what further protection measures are essential.

Under the assumptions of "Operation Alert," (last June's FCDA exercise) the private line Civil Air Defense Warning network, now in operation to warn the nation of an impending attack, would suffer



The planned route of the first transatlantic cable is laid out so that it will minimize the hazards of ice, trawlers, and existing telegraph cables.

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substantial damage by the accurate strikes of the 46 atomic bombs. In this case, however, arrangements have been made to back up this network by calls placed over the regular message circuits used in our day-to-day business. The possible reroutings available to operators are many, and such calls can frequently be put through where a fixed private line network requires patching arrangements at various points and takes some hours to restore.

This arrangement gives fairly good coverage, but does suggest further study if we are to assume conditions in accordance with this exercise. Combinations of radio, bypass arrangements, and other protective measures are known, and it is entirely a matter of taking a calculated risk or of making the necessary arrangements to provide greater security. Should substantially complete reliability be essential under the extensive bombing conditions assumed, large expenditures will be needed.

We in the Bell System will look closely at all measures which can be taken within the scope of our normal service provision to afford additional protection under such conditions. We also plan to review carefully our existing routing arrangements, and in our plans for the future will take advantage of all possible measures to improve the protection of vital military-civilian services. The expenditure of the total amount which would be required for complete protection to the extent that such protection can be afforded would be substantially beyond our current thinking as to our responsibility without some aid from the customers who require the security that makes such construction necessary.

What happened to the Western Electric Company under assumptions of the 46 bomb attack is of interest. The Western

Electric Company currently employs about 102,000 people. It has plants at 16 locations, which are dispersed over the eastern part of the country. While some of the factories are fairly specialized in the products they manufacture, there is a good distribution among the various locations. In addition to the manufacturing locations, Western has 29 distributing houses throughout the country. Since Western is shipping some \$900,000,000 worth of goods a year to the Bell System companies, its monthly output is around \$75,000,000. This is a very heavy going rate of goods, and, together with the current stock situation, which currently is running around \$100,000,000, affords a tremendous reserve of materials and equipment always in transit. And the 46 bombs did relatively little damage to Western's plants and distributing houses.

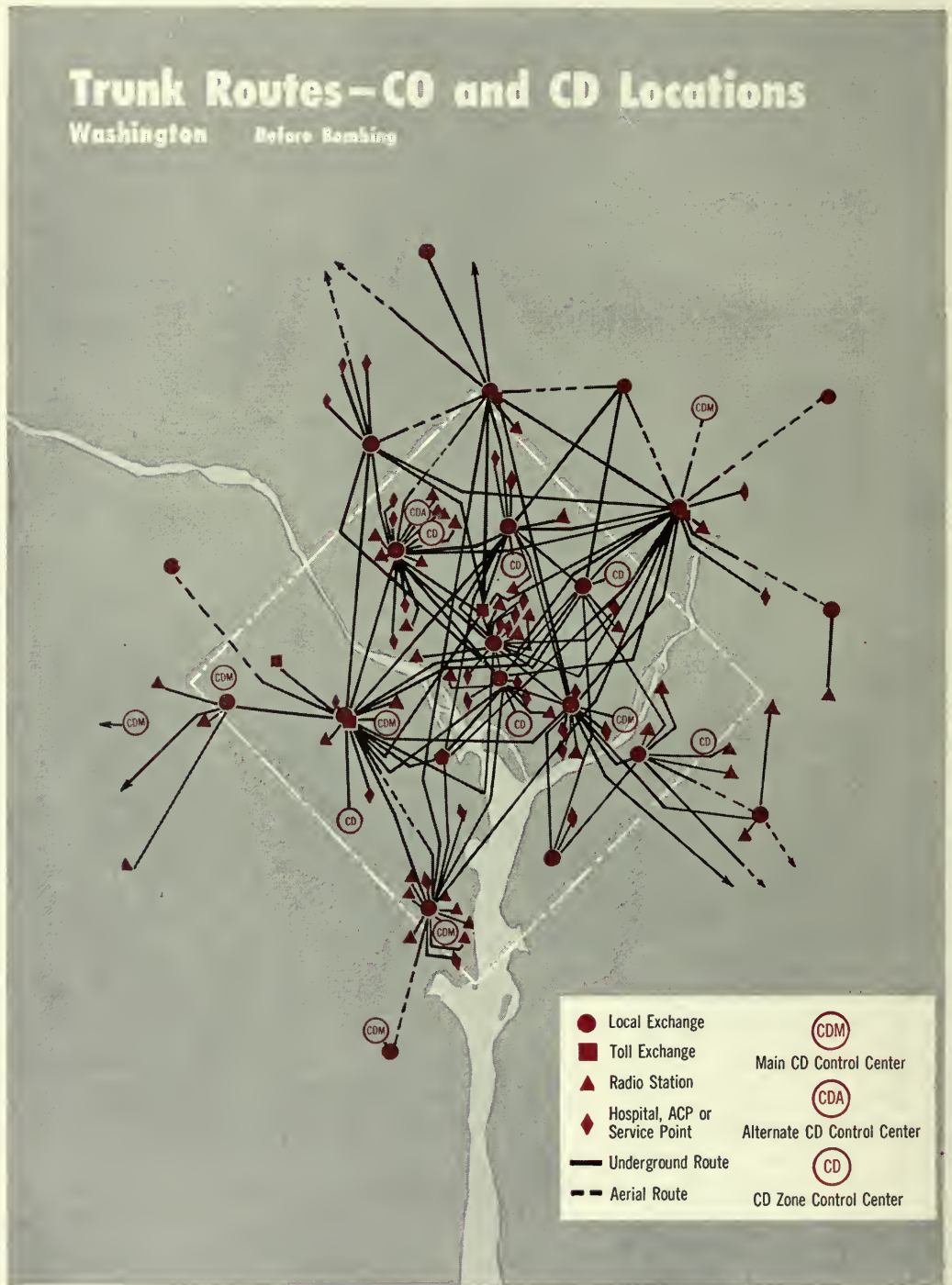
Communications within Cities

COMMUNICATIONS within our larger cities is part of the whole problem. It is important particularly with reference to what can be done under emergency conditions—that is, under conditions following a nuclear attack. Baltimore may be taken as a representative situation.

Working in association with the Civil Defense people at all levels, we have developed recommended arrangements which, if installed, will go far to aiding the civil defense work after an atomic attack. Communications will be almost the key factor in good disaster control, and the Civil Defense people have established control centers at locations some distance from the downtown area. These control centers are, in some cases, connected to two of the local central offices. This provides diversity protection in case the main office to which the control center would normally

Trunk Routes—CO and CD Locations

Washington Before Bombing



This schematic diagram shows the trunk routes, principally underground, interconnecting Washington central office buildings and serving the Civil Defense control centers.

Trunk Routes—CO and CD Locations

Washington After Bombing



A bomb explosion over the center of Washington would destroy or damage enough central office buildings to interfere with but not to completely destroy essential communications.

be connected is destroyed. Communications from these control centers to many of the operating units within the city are necessary, and are handled through a vast network of underground cables. Communications to higher echelons of the state and regional centers are also required.

Under an assumed attack such as "Operation Alert," a large part of the downtown center of Baltimore would be completely devastated. As you get to the fringes of the devastated area, you encounter conditions which require most intensive rescue work. Based on the assumptions of a direct hit in "Operation Alert," Baltimore would lose seven of its local central offices. The rest of the central offices would still be in operation, and communications would be provided between the remaining offices by undamaged trunk routes. The numbers of trunks between offices would vary between two and 1,600.

The telephone buildings involved are all of steel frame or reinforced concrete construction, and are built heavily to carry a floor load of about twice as much as standard office buildings. Generally speaking, telephone buildings would stand up better than most of the buildings in the areas in which they are located.

Certain central offices around the fringes of the disaster area are assumed to remain in service. For example, the University office, to the north, has a serving area extending into the devastated section, and would, therefore, be able to furnish communications on the fringes of the disaster area from existing telephones that were in buildings not completely destroyed or by the extension of field wire lines into the area. It would in turn be able to extend these communications to the remaining control centers or other points of operation and would have trunks to the toll restora-

tion centers for contact with other cities if necessary.

Power for Bell central offices is supplied by large storage batteries, which are normally charged from commercial power services. These batteries have reserve capacities of from four hours to a number of days. Should commercial power fail for a short time, the batteries would carry the load. Longer failures are cared for by emergency diesel or gasoline-driven generators installed in the larger offices and by the provision of portable engines which can be rotated among the smaller offices to keep the batteries charged. There are about 2,500 permanent installations and 2,000 portable units in the Bell plant.

Atomic Tests

EXPERIENCE with the early atomic explosions, and recent tests at the Nevada proving grounds, where the Bell System participated in tests conducted by the Signal Corps to find out the resistance of telephone plant to atomic explosion, indicated that for an air burst at any where near optimum height, the underground cables and manholes will not be destroyed. A ground burst of an "A" bomb, and possibly a very high powered H bomb at low altitude, would produce a crater, with consequent damage to underground plant.

The significance of this cable network is that, as long as the central office building and equipment is in operation, it would have many possibilities of serving the disaster teams of the CD organization. If the central office is destroyed, magneto local-battery telephones can be interconnected by its use.

Supplementing the land line communications would be the mobile radio transmitters and receivers in Baltimore. It may be assumed that some of these locations

Emergency Mobilization and the Bell Telephone System

are destroyed, but the remaining stations would provide some service.

Many more details of Civil Defense planning are covered by pamphlets issued by FCDA and by the Bell System for the assistance of local Civil Defense organizations. The objective is to provide as well as possible for operations under emergency conditions—but to do so with a minimum of expense during peace time. Basic communications which can be rapidly augmented by conversion of facilities normally devoted to regular commercial purposes appears to be the best way of preparing for Civil Defense operations.

To improve further the security of vital communication, the telephone companies offer to Civil Defense organizations and military bodies arrangements whereby important circuits within a target city, or the parts of the circuits within a city, can be placed completely underground.

Much more needs to be done in adequately preparing for the Civil Defense job throughout the country, but we believe we know how to do it. The problem is to balance the expenditures for such protection against the risks involved. In other words, it is again a matter of the "calculated risk." So far, such expenditures have not been large at either the local or national level.

It is not possible, for obvious reasons, to be specific as to government and military services and their use of the Bell System organization and its communications.

Present Government Services

OF THE TOTAL intercity telephone circuit miles available in the Bell System, about 1.5 per cent are currently in use by the military. Of the telegraph miles, about 3.6 per cent are in use. For telephone instruments and teletypewriters, the percent-

ages are .8 and 9.9 per cent respectively. The important point here is that present military usage is a very small portion of the total available plant. In other words, in the operating field there are tremendous reserves ready for instant use by the military people.

The various military services are, however, using some of the principal private line networks. The Air Defense Command has the largest telephone network at the present time, comprising some 132,000 miles of full-time circuits, with 73,000 miles of so-called "engineered" circuits. These engineered circuits are facilities which it has been determined by the Air Force are not needed for peace-time operations but would be required immediately under an emergency. Arrangements have been worked out between Bell and the Air Force to establish these additional circuit facilities on very short notice. It is anticipated that the 73,000 miles of engineered circuits can be taken out of the regular commercial intercity network and placed at the disposal of the military people within one hour of notice to the Bell System. Exercises to test this capability have been carried on over the last two years, and while the one-hour goal has not quite been reached, over 95 per cent of the circuits have been established within one hour and the balance within two hours. The military organization is, of course, not charged for the engineered circuits when they are not in use.

Problems of protecting military networks are similar to those described for CADW. With many military posts located outside of the larger cities, there is a further problem of getting their service to the main long distance network in case the regular serving office is destroyed. One method of accomplishing such protection is to estab-

lish transfer relay arrangements in the cable vaults or in manholes—as appropriate—which would reroute the important circuits from the military base to a more distant city under control of the base commander. For example, two routes from the base to the long distance office afford additional protection against damage to the local cable facilities. Each of these routes could be equipped with transfer relays located in underground spots which would extend the military circuits to another intercity office.

In the tests previously referred to, transfer relays satisfactorily withstood air bursts of the A-bomb.

Another way of protecting an important military location is by giving the location access to more than one of the Bell System long distance offices. This can be done in cases where the site is of sufficient importance to the military to warrant constructing a second route.

Another important phase of military operations which requires reliable communications is the necessary interconnection of the various anti-aircraft and NIKE batteries which are currently being installed to protect some of the larger cities. In such an installation, there is a central anti-aircraft operations control point plus several subordinate points which provide for the defense of pie-shaped sectors covering the entire territory. Under intensive bomber attacks, the central AAOC relinquishes control to the subordinate AAOCs.

Communications are provided by both wire and radio. One facility backs up the other but both are used for regular operational purposes. Continued operation is possible even if one of the services is interrupted.

In addition to the preparations which have been outlined for guarding against

interruptions to service at all times, the telephone companies have prepared restoration plans for all of the important long distance centers. By this we mean that, assuming the long distance center building was destroyed in a large or small town, plans are available for picking up intercity circuits to other cities at outlying locations. For the smaller towns, this merely means bringing some of the wires out at a junction box somewhere on the outskirts of the town. For larger towns it may mean that wires are terminated in certain of the smaller outlying offices to which can be connected magneto telephone sets which provide their own ringing and can thereby establish communication to the next town. All of these factors go to make up a unified system designed to give a maximum of service continuity and to provide for rapid expansion when necessary.

FOR ALL THE REASONS here recounted, the telephone networks form the best basis for meeting the communication requirements for civil defense, for military operations, and for other government necessities either within a city or country-wide.

If in certain situations additional facilities beyond those now available appear to be needed, they will be most effectively used if they are associated with the present telephone system and thus have the advantage of the flexibility of interconnection and the responsibility of the large construction, maintenance, and operating forces of the Bell Telephone Companies.

As a final item, the will-to-do of the telephone forces is as great now as it ever has been. It is their intention to devote their energies and their efforts and their scientific ingenuity to the best of their ability to the number one job which is national defense.

A revolution in record-keeping procedures will one day be required to cope with the sheer magnitude of the System's expanding bulk of detailed operating data

WHAT ACCOUNTING SEES IN ITS CRYSTAL BALL

FREDRIC M. BIATHROW

Supervising Accountant, COMPTROLLER'S DEPARTMENT, A. T. & T. CO.

THE FEBRUARY 1942 issue of this MAGAZINE carried an article entitled, "Bills for 13,000,000 Customers," telling of the work involved in billing our customers for telephone service. In retrospect it seems unlikely that anyone could have foreseen, a dozen years ago, the tremendous growth all across the country which would result today in the number of Bell System customers reaching a total of 30,000,000.

Month after month, on predetermined schedules, some 32,000 telephone people see to it that the bills go out—promptly and accurately.

However, the job of preparing and issuing customers' bills is only a part of the Accounting Department's broad contribution to the work of the Bell System. As telephone people throughout the nation go about the day-to-day job of furnishing service, their combined efforts leave behind billions of individual records: central office equipment placed, long distance messages completed, hours worked, buildings constructed, old equipment retired, telephones installed. In fact, the list is seemingly endless. Most of the data these records represent have to be processed

into a final form, be it a customer's telephone bill, inventory record, payroll, or administrative or financial report.

Let's look for just a moment at what steps have been taken by accounting people to cope with the problems arising from the mounting volume of records work.

In the early years of the telephone business—in the days of the pen and the ledger—all data were handwritten. In those days the fortunate individual with the Spencerian hand was looked upon with envy by his associates. As the country grew and prospered, so grew the need for faster communication and began the day of engineering marvels. Paralleling the advances in telephone technology were the invention and manufacture, by commercial firms, of machines and equipment to handle the records work of the nation. As machines became available, Bell System people studied every possible application, and those suitable for our kind of business were acquired. But still the operations are largely manual: people run typewriters, adding machines, payroll machines, and many other kinds of equipment. Each of these many machines performs but a sin-



"In the days of the pen and the ledger." A telephone company accounting office in the early days of this century.

gle function, and their input and output are governed by the human limitations of the people who operate them.

As punched card equipment was developed, it too was acquired for Bell System accounting work, and is being used today for many jobs. For some time, people thought that this might be the answer to the problem of handling the growing volume of records work. By using a machine similar to a typewriter, original data can be punched into a card in the form of codes. Then relatively high-speed machines are used for sorting, computing, and printing the results. Our experience indicates that, while punched card methods have many economical applications to the accounting job, they also have their limitations.

As long as present recording procedures are followed, thousands of people

will continue to sort and process toll tickets, cash payment and service order records by dealing with one piece of paper at a time—an individual ticket, payment stub, or service order. Automatic Message Accounting (AMA) equipment is being installed at numerous locations across the country as additional areas are opened for customer dialing of multi-unit and toll messages. Ultimately this equipment will automatically record a large volume of traffic which is now recorded on tickets. Helpful as this will be, it still leaves a tremendous amount of record-keeping to be performed by means which do not permit mechanization.

Out of the Accounting Department's experience has grown the firm conviction that the problem of mechanization will not be satisfactorily solved until a means has been found to record original data in



The service order unit in a modern accounting office. Service orders are processed one at a time.

a form which can be automatically transferred to a medium suitable for use with automatic equipment.

If the machines and equipment known today are inadequate, what does the future hold? Can the Bell System meet the challenge of the ever-increasing growth in record-keeping which we believe lies ahead?

Revolutionary Procedures Needed

To COPE WITH the future, we need a revolution in record-keeping procedures. Improving present methods no longer appears to be good enough. We need to find new and different means of recording and processing the tremendous volume of detailed data that the System necessarily produces in the process of furnishing an ever-improving service to our customers.

Where will we find a new and revolutionary concept which will provide a solution? We are looking to the technical knowledge of the electronic engineer for our answer. Can we build an electronic accounting system designed to handle the

kind of records which, in large measure, are found only in telephone business?

Before we take a layman's look at how such a system might operate, let us analyze the customer's billing job to see what is involved. For each customer we must:

- Establish and maintain a record containing his telephone number, name, address, service furnished, and the amount of his monthly local service charges.

- Process the records of his calls to places beyond the local metropolitan area which are to be detail-billed on long distance service statements.

- Process the records of his calls to nearby places which are to be billed in bulk.
- Change the status of his account each month to reflect payments and adjustments.

- Print a new bill each month which will contain all the current charges due the company.

As we analyze these separate operations, we find that computing, sorting, and printing functions are the basic requirements.

We need computing for such operations as determining the total charge for equipment furnished, pricing toll messages, applying excise taxes, and crediting cash payments to customers' records.

We do sorting to arrange data in an orderly sequence, usually by the digits of the telephone number.

Printing is required for the preparation of toll service statements, customers' bills, and reports.

There we have the principal ingredients: compute, sort, print. It sounds simple. It is simple until you realize that last year tickets for some two billion L.D. messages were handled by the Accounting Departments of the Bell System and some 360,000,000 bills were issued to customers. In "handling" the toll tickets, seven different people looked at each ticket in order to determine the charge, record for settlement, sort into telephone number order and verify, prepare a long distance service statement, and finally, total the charges for each customer. Thus, the two billion became *fourteen billion* for proc-

essing purposes. It's the magnitude of the work which creates the problems rather than the complexity of any one operation.

The equipment we need must, therefore, be able to do simple arithmetic, sort the data, and print the results in a final form.

Electronic Computers and Common Control Switching Systems

MUCH HAS BEEN WRITTEN and said recently concerning the possible use of commercial electronic computers for general business purposes. The development of these machines received its greatest impetus from the need for quickly solving mathematical problems arising from military defense requirements. Guided missiles, radar, supersonic airplanes, rocket performance, gunfire control—all require tremendous amounts of mathematical computations. From the universities and from the industrial laboratories came ideas and computer equipment to meet the need.

Perhaps the ancestors of the computer

The long distance service statement unit in a modern accounting office. Individual toll service statements are prepared on the typewriter.





AMA (automatic message accounting) equipment. It records customer-dialed calls.

art as it is known today are the common control switching systems used so extensively in the Bell System. These systems, which were developed in the early '20s for switching local dial telephone calls, have now reached a point where it is possible for some customers to dial individual telephones in certain distant cities in the United States. These huge mechanical "brains" accept dialed destination instructions, automatically search out the most desirable route from the many which are available, and find the particular called telephone from the millions of possibilities. The Bell System first produced a digital computer for scientific calculations in the middle '30s, and has continued to take an active interest in the fundamental development of these and similar computers for the armed forces.

One of the first so-called "thinking" machines to receive wide publicity was the Mark I, built in 1944 by the IBM Corporation and presented to Harvard University. A giant in size, it was also a giant in performance—in that in a few minutes it

could solve problems which would take months to solve on conventional computing equipment. Many universities and commercial firms have developed equipment in the electronic computer field, until today we have machines known as BINAC, CALDIC, EDVAC, EDPM, UNIVAC, and many other identifying names.

Of these computers, Remington Rand's UNIVAC has probably received the widest publicity as a result of its television appearance forecasting an Eisenhower landslide early in the evening of election night, 1952. As the world soon knew, the scepticism with which its forecast was greeted was unfounded, and the final election results closely approximated those predicted. The flexibility and wide adaptability of electronic "brains" was demonstrated recently when the IBM "701" was used to translate Russian sentences into English on the basis of a formula developed by Georgetown University.

Outside of Bell System switching systems, the emphasis in building the contemporary computing "giants" has been

on the solving of complicated mathematical problems involving relatively limited amounts of original input and final output data. Commercial firms are currently developing equipment designed for more general business use. Although these developments hold great promise for record-keeping work, they do not solve our basic problem of recording the original data at the source in a form which can be handled by electronic equipment. Nevertheless, they have demonstrated the commercial feasibility of such components as the magnetic tape, magnetic drum, and other storage devices, together with the electronic circuits which tie them all together into a processing system.

Electronic Equipment Designed to Meet Our Specific Requirements

AND SO THE REVOLUTION for which we are searching appears to lie in the development of data-processing equipment utilizing electronic components and principles and designed to meet our specific requirements. But how might we solve the problem of recording the original data in a medium suitable for use with automatic electronic equipment?

Today most people are familiar with the use of magnetic tape for recording voice and music. Although the principle of magnetic recording has been known since 1898, it is only in recent years that it has been put to a more practical use for recording numerical and alphabetical information.

Original "writing" on tape is usually accomplished by typing the data to be recorded on a special key-pulsing machine which uses a keyboard somewhat similar to a regular typewriter. The characters are recorded in coded form by means of electrical impulses which magnetize spots

on the tape. Although the recorded data are not visible, electronic processing equipment can read the magnetized spots and control the performance of a series of operations with the data. The result can then be automatically translated into standard characters and printed on a bill or statement.

Another medium for recording data which is not so well known is the magnetic drum. This operates on the same principle as the magnetic tape and differs only in that the recording area is placed around the outside of a cylinder which is mounted on a shaft.

Still other electronic storage media are available—such as electrostatic storage tubes, transistors, ferro-electric storage devices, magnetic core devices, and perhaps many more which are over the horizon.

Data recorded on these or similar devices are in a form which can be automatically handled by electronic processing equipment. How might they be used in the telephone system? With AMA, the details of customer-dialed intercity messages are automatically recorded in coded form on paper tape by perforators operated by electrical impulses. They could be recorded on magnetic tape. Likewise, drum recording might be a possible substitute for the present message registers. A magnetic tape record could be taken from the teletypewriter equipment used for service order reporting.

A photo-electrical scanning device has been demonstrated which has the ability to read printed characters. This equipment might well be used to automatically transfer data from cash payment stubs to magnetic tape.

A completely satisfactory procedure for automatically transferring data which are

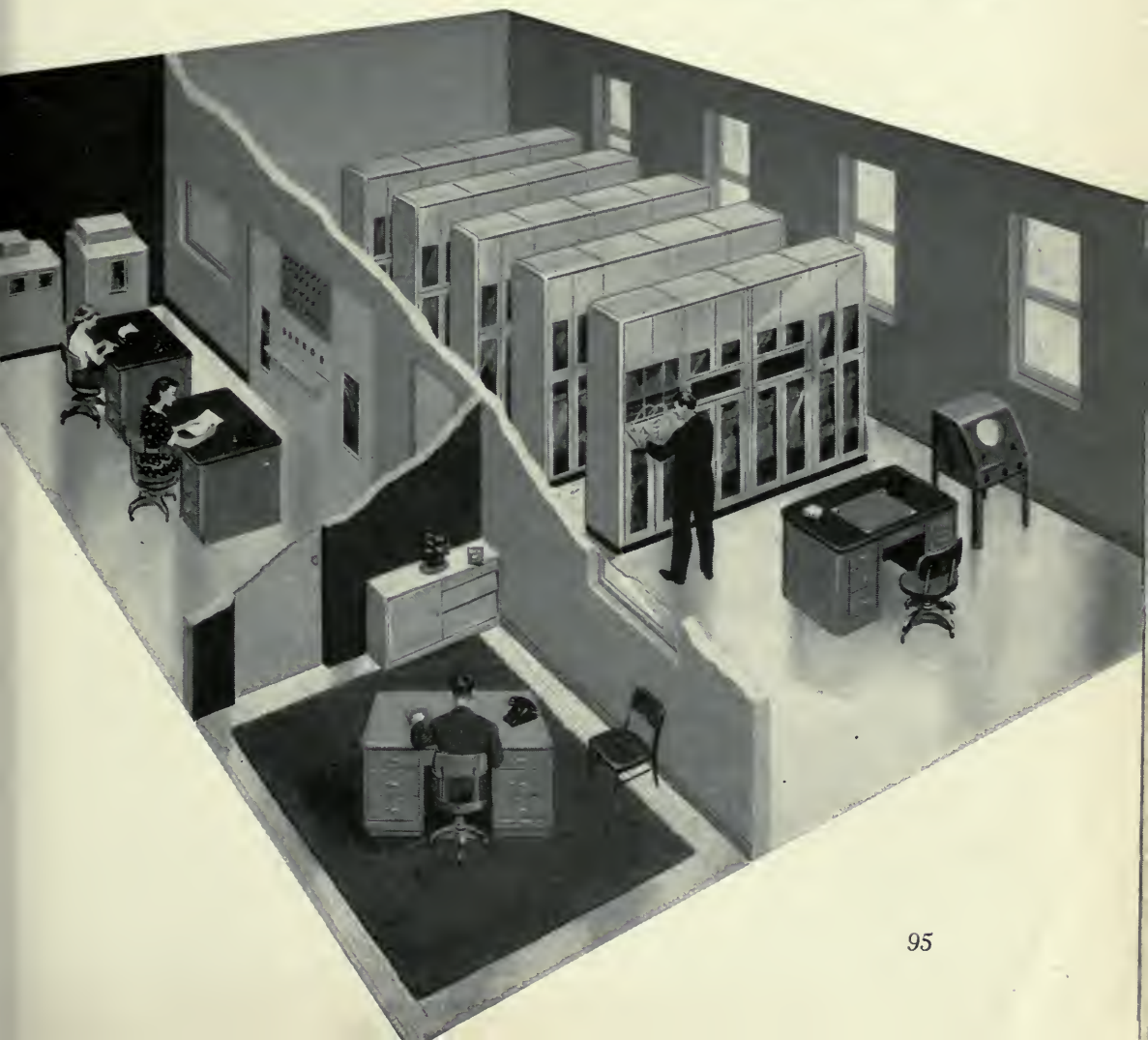
What Accounting Sees in its Crystal Ball

handwritten to a recording and storage medium suitable for use with electronic equipment has not yet been found; but the IBM mark-sensing method at least offers a feasible plan for handling much of the data which cannot be recorded at the source by means of electrical impulses. The mark-sensing method involves the use of specially designed card forms with preprinted letters, digits, or codes representing the data to be recorded. A penciled line is drawn across the proper printed character or characters as required by the transaction involved. The

cards are run through an IBM machine which electronically senses the presence of the graphite pencil marks and punches a corresponding coded hole in the card. The data can then be transferred by machine to magnetic tape.

The use of magnetic devices will permit the storing of tremendous numbers of records in a remarkably small space. For example, the details of 100,000 L.D. messages can be recorded on a reel of magnetic tape about the size of a dinner plate. A similar number of messages recorded on the present paper tickets would require a file

*The telephone accounting office of the future
—as an imaginative artist foresees it.*



some 40 feet long, while punched cards would occupy a file 55 feet long.

Despite the tremendous possibilities of electronic processing equipment, it can perform no operation until it receives instructions as to what should be done. Therefore, each operation to be performed must be completely analyzed for the steps required. These instructions or "programs" could be stored in the equipment in electro-mechanical or electronic devices and would comprise the "brains" of the system.

Much of the accounting work is concerned with sorting data into telephone number order. Once the data are recorded in the language of the electronic equipment, the sorting can be performed automatically under the direction of the program for the particular operation involved. In terms of relative speeds, the sorting of 100,000 intercity messages can be accomplished in a fraction of the 100 hours required under the present method. In an electronic system such addition, subtraction, multiplication, and division operations as are required would be performed by an automatic arithmetic unit. Magnetic drums containing basic tariff charges, tax rates, payroll tax deduction data, and other information, could form the reference part of the unit. Thus, when basic data were fed into the machine from the tape, the factors required for the particular computation would become available as needed to meet the requirements of the particular problem to be solved.

In our business, we not only have to store and process tremendous numbers of individual records, but also to print the

final results on millions of customers' bills and pay checks—month after month. Commercial line-at-a-time printers, which work from magnetic tapes, have speeds of around 9,000 lines per hour. This, of course, is a vast improvement over a typewriter printing one character at a time, but it still falls far short of the speeds with which data can be read out of electronic equipment. Development work in this field may soon result, it is believed, in commercial printing equipment much faster than anything now available.

The Needs of All Departments

MUCH NEEDS TO BE DONE before a prototype accounting office of the future becomes a reality. The work involved must be done by skilled system and electronic engineers working closely with accounting people to insure that, once an electronic accounting system is designed and built, it will meet the requirements of the present and of the future. If the Accounting Department is to be equipped with electronic high speed processing equipment, consideration should, of course, be given to its use for meeting the data processing needs of all departments.

As is the way with revolutions, many situations will arise which must be resolved as we go forward. It is our belief that technological advances in electronics offer a solution to the problems inherent in record-keeping, and that the Accounting Department can look forward to being equipped with modern tools to cope with the growth of business which we believe lies ahead for the country and for the Bell System.

ANNUAL MEETING, 1954

THE ANNUAL MEETING of the American Telephone and Telegraph Company is held each year in April. It is a corporate action required by law, the purpose being to elect directors for the following year and until their successors are elected, and to vote on any resolutions set forth in the proxy statement.

The president conducts the meeting, comments on matters of special moment, perhaps gives his views on the outlook for the coming year, and replies to questions. Recent meetings have seen an increase in the number of share owners who attend in person—this year about 1,400 were made welcome—and in their participation in discussion.

Closed-circuit television this year and last brought to groups in adjacent rooms the proceedings in the assembly room, and this year it was also used to present to the meeting, on large screens, a half-hour "live" picture of many of the operations and activities of Long Lines telephone people.

To the share owners, the Annual Meeting affords an interesting review of the operations of their business. To the press it is usually news. And to the many A. T. & T. people involved, the meeting is the climax of weeks of preparation. The next ten pages show some of these people and the parts they played in this year's meeting.

Whitney Landon, A. T. & T. Secretary, and James A. Farmer, A. T. & T. General Attorney concerned with corporate and financial matters, confer about the preparation of proxy material for the 1954 Annual Meeting.





Proxies go out by mail to the share owners—more than a million and a quarter—of the A. T. & T. Co.



Left: Within a few days, proxies start to return to A. T. & T. in increasing numbers.

Below: The envelopes are opened swiftly by deft machines.

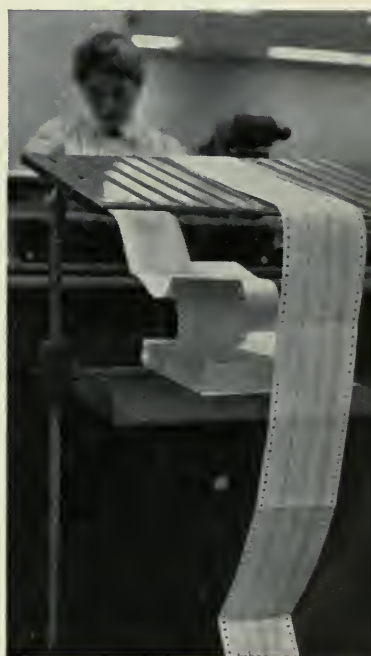




Each returned proxy is carefully examined to see that it is filled out correctly, and to make note of any special comment or instructions.



Proxies are sorted by machines, recorded, and a continuous tally is maintained.





Share owners' questions are answered and other matters are cleared up promptly by telephone and letter.



Inspectors of election pass upon the validity of proxies and certify the final count of votes.



The final tally: the total of all votes cast, to be reported at the Annual Meeting.



Share owners attending the meeting are asked to stop at the counters in the main lobby at 195 Broadway and obtain admission tickets.



Records temporarily set up in the lobby enable the attendants to verify share ownership quickly.



Attendants greet the share owners cordially, obtain their names, and fill out and hand them the cards which admit them to the meeting.





"Shots" from television cameras viewing various Long Lines activities were monitored in a control room temporarily established there.



Employees in the several Long Lines departments rehearsed before the television cameras their descriptions of the parts they and their equipment play in providing service. On the day of the meeting, they were brought before the share owners on large screens over closed circuits between the Long Lines headquarters and the A. T. & T. building.





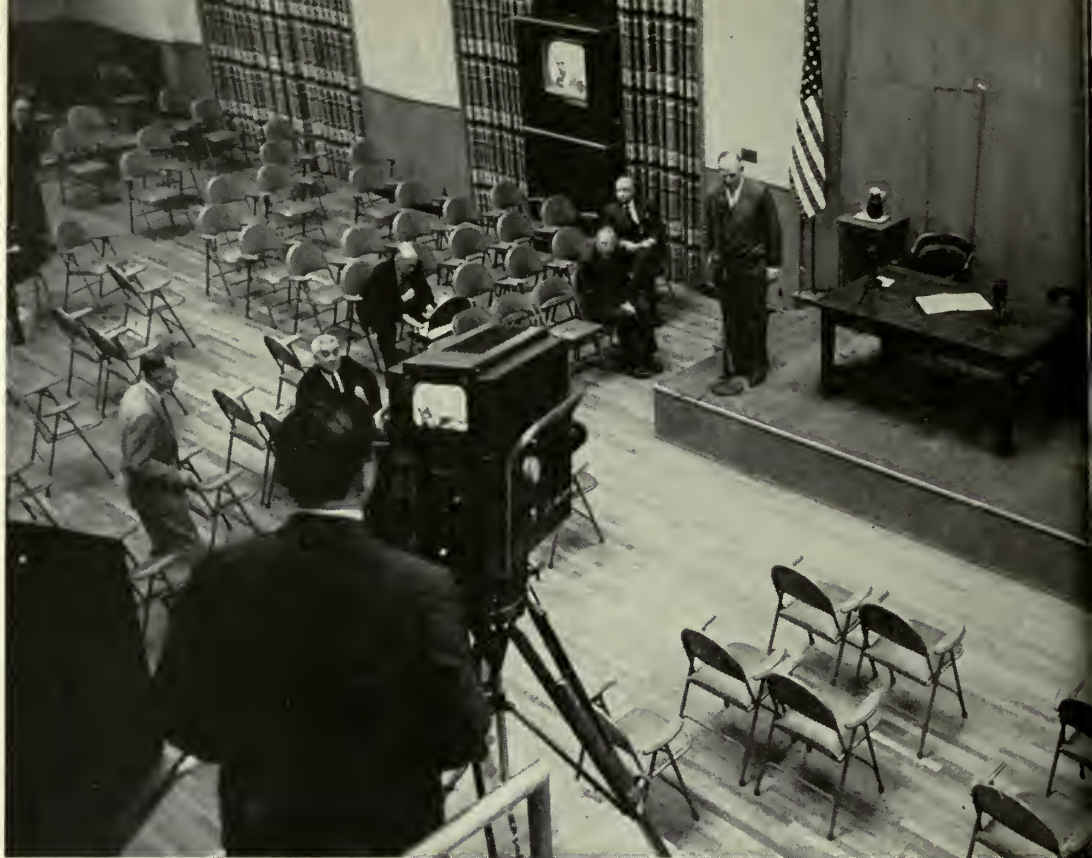
Make-up is important for appearance before the television camera.



Representatives of several Long Lines departments consider factors which will affect long distance service in the future.

Long Lines operators at a long distance switchboard. Professional experience and skill were called on for technical phases of television production.





Rehearsal: Before the meeting, A. T. & T. President Cleo F. Craig, on platform, and others try out the acoustics of the assembly room and the placing of the closed-circuit television cameras which bring the activities there to share owners in adjacent rooms.



Chairs make an orderly pattern before the meeting.



Control of the television screen in the assembly room below is serious business.



*The secretary makes formal announcements at the beginning of the meeting.
Mr. Craig is seated beside him.*



Share owners are attentive as the business of the meeting is transacted.

The press is well represented.





Vice President Killingsworth, head of Long Lines, demonstrates the speed of customer long distance dialing on a call to San Francisco.

Balcony seats afford share owners a clear perspective as their attention centers on the proceedings on the main floor.



Shares voted at the meeting are checked against the proxies which have been received by mail and with the stock records.





President Craig greets and converses with share owners after the meeting.



A share owner continues the discussion of a point of interest with Mr. Craig.



Day's end.

Every day is moving day for America's telephones—which presents to American's telephone companies problems of increasing complexity in this post-war era

TEAMWORK IS ESSENTIAL TO THE INSTALLATION JOB

BLAINE HOOVER, JR.

Exchange Service Engineer, O. & E. DEPARTMENT, A. T. & T. CO.

THE JONES FAMILY is moving and, as in most families, Mr. and Mrs. Jones have a multitude of things to do: get hold of a mover, pack their belongings, and—oh, yes—call the telephone office.

Giving the Joneses service in their new home, like installing the multi-line key telephone equipment for the new auto dealer or the single-party line for the high school set's dating calls, is an obligation that must be met. It is requirements such as these that keep telephones changing their numbers, their locations, their users every day. In fact, each year, on the average, two out of every five telephones in service will be affected by these customer demands.

Meeting the many needs of customers in the post-war period has made the telephone companies' installation job a larger part of their business. These demands have been met not only by an expansion of the plant but also by a more effective utilization of that plant. In addition, there has been an increase in the volume and types of complex services requested. Meeting

these has resulted in a more difficult service problem—which involves also a greater investment and greater operating cost.

If we follow the Jones' moving problem as a typical installation job, we will soon realize that there are few operations in this business which require more team play between departments, right from Mrs. Jones' original call to the business office to the listing of their new number in the directory. Many telephone people make up the team. In this instance it begins with Mary, the service representative, who handles Mrs. Jones' request and initiates the issuance of a service order for Jim or Susie, in the plant assignment office. He or she processes the order so that John, in the central office, and Pete, in the installation truck, may complete the work. When it is ready for service, Betty will be at the OK desk in the plant service center to take Pete's report and notify the other girls in the traffic, directory, accounting, and commercial offices of that fact.

Mrs. Jones enjoyed calling the business office; "The girl was so considerate and



A service representative handles a customer's request for telephone service.

friendly" she told Dad that night. "She was very patient about explaining the rates we will have in the suburbs, and she let me choose the date so that we will not be without service during the move." Of course Mary had noted all of these items and many others on her contact memorandum. For it is from this memorandum that the service order is originated to notify all operating groups and to inform them of the work to be done.

By messenger, pneumatic tube, or teletype, the Jones' order travels to the Plant assigners. When the order arrives in the assignment office there are many things to be done—for this is the hub of the plant

operation. Here the assigners must plan the web of wire and relays which will carry the service to the Jones' new home, and here they regulate the work load so that installers will be available to make the connection.

The Plant Engineering and Construction members of the team have designed and constructed the cable and wire lines out into the Jones' new subdivision. Were cable not available, the assigners would have to devise alternative arrangements or routes to keep this request for service from becoming an unfilled order. This requires careful consideration—which is why the foreman makes a check of each order held,

and often arranges for a field visit, before referring it to the engineers. It explains why they also check the essential records by which the assignments are made of the cable pair in the distribution terminal on the pole at the back of the house, at the cross-connection terminal in the big box down at the corner, and on the main frame connections in the central office.

The central office equipment in the new telephone building which will serve the Jones family has been designed by the equipment engineers and made and installed by the Western Electric Company—the manufacturing and supply branch of the Bell System. The switching equipment and telephone numbers are carefully and continually studied by the Traffic assignment people to maintain balanced use of this equipment in order to give good service to as many telephone users as possible. From one of the Traffic lists of available equipment, the Jones' telephone line and number are selected. Again team play is tested for, without lines in the right central office, the Jones' would become another order held for central-office equipment.

The Plant assigner has now reserved the cable pair, the switching equipment, and the telephone number, and Plant is ready to start the action—as well as to give advance notification to the directory clerks and the Traffic intercept people about the new telephone Mrs. Jones called for.

She called in the morning and by afternoon the central office people are arranging for the wiring work which will connect the facilities reserved for their new location. This is where John enters the picture.

John has been "on the frames" for a year now, and has become skillful in wiring the necessary connections between the central office equipment and the main frame terminations of the outside cable. He is an



The service order is sped to other departments by teletypewriter.

important link in the Jones' new telephone service. A slip on his part could cause all sorts of errors. Since the order to establish their service is due tomorrow morning, John will place all the wire this afternoon to insure against delays.

Pete, the installer, asked for outside work when he returned from the wars. He has been assigned a truck which he keeps as shipshape as the PT boat on which he served. In the morning his foreman had handed him his day's assignment. Plenty to do, he thought, but the boss knew it because the work load had been carefully planned for the number of men available that day. Another thing Pete had heard was that it took stockholders'

Teamwork and the Installation Job

dollars to pay for these new installations, and since he, like most of the fellows, was buying A. T. & T. stock, it seemed important that they be done efficiently to insure his getting a good buy.

By that time he had reached his truck and loaded his equipment. His "due dates" were on the top, including the Jones' order. After caring for an "inside move" down the street, he saw the moving van at the Jones' new place and knew they had arrived.

Telephone, directory, and tools in hand, he met Mrs. Jones at the door. This was another reason he liked the job: he liked people. And most people were very appreciative of the service and consideration he tried to give. Mrs. Jones was impressed by his friendliness and his business-like manner and his knowledge of her requirements. After they had discussed the telephone location, she and her young son watched him for a few moments, then she once again turned her attention to the details of moving.

Pete had worked in this type of house before, and soon he had planned the job and was up on the pole checking the cable facilities and telephone number through the Traffic verification operator. Everything checked out OK. He needed that kind of team play if he was going to finish all his service orders in time.

Pete was thinking of what George, his foreman, had pointed out to him the day before while visiting with him on a job: that the progress made in improving methods, materials, and tools from year to year now made it possible for Pete to do parts of his job with less effort and in less time than the same job would have taken George in the days when he started with the Company. Pete hadn't realized, either, that the average tool-using employee is equipped with over \$400 worth of tools in addition to his truck.

Pete is a careful workman; he has found that it goes best that way. That's why he uses the proper tool for each job, always

In the Plant assignment office, cable facilities are assigned on the service order.





Cross connection at the main frame brings central office equipment and outside cable termination together.

wears his goggles when there is the possibility of injury to his eyes, and keeps a good flashlight for use in basements, attics, and other dark spaces in which he has to work.

He usually has an audience to play to, and today it is Mrs. Jones' young son. Running the inside wire through the basement to the connecting block brings Junior downstairs and now Pete's job includes answering the "whys?" of a future installer.

A check of the set's connections and his regular dial tests assure him that everything is OK. Mrs. Jones returns when he tests the bells so that he may regulate their loudness. Pete also takes time to instruct her on how to dial—for this is her first dial

telephone. It would be nice, she thought, if her husband could be as careful as Pete about cleaning up after his work.

The "OK Desk" is right on the beam this morning as Betty answers Pete's call. She has a copy of his order at hand, and in a minute she has the information required to notify all departments that the Jones' telephone is in and that billing should begin with the message register readings that John gave her.

The Traffic people must now post their records so that calls to the Jones' former number will be referred to the new; directory changes are made final for the next directory release; the commercial representative brings her records up to date

for future contacts with the Jones family; the Plant maintenance people establish a new record to facilitate trouble handling; and the revenue accounting people are responsible for the new billing charges and change of address.

Last, but not least, the accounting girls post to the books how many stockholders' dollars have to be paid out for materials as well as for Pete's check and other plant payroll checks.

The Jones' order is typical of the major part of our installation job. Its routine nature tends to hide the team efficiency required to meet this increasingly difficult service job. When all members are fully doing their part, our customers' requirements are cared for at a cost they can afford.

Emergency Installation

DO YOU THINK ALL of the installation job is routine? In some respects, perhaps, but there are exciting times too!

About a year ago it was thought that the Missouri River was going to flood out Council Bluffs, Iowa. The only thing preventing it was an overloaded levee on the river, which needed a constant watch for signs of weakness. Northwestern Bell installers had the job of putting in sure-fire telephone installations at every critical point on the levee. And they did a record job of it, too.

A year ago the installation and repair team was on the go for a continuous 24 hours getting service into hurricane-blasted Cleveland, O., and Worcester, Mass. In such circumstances, it takes time for the service orders to catch up and the paper work to be completed, but otherwise the team-work was the same as on the everyday job. The Plant installers have earned their place on the restoration team



Before installing a new telephone, the installer verifies the service order with the customer.

and for that reason have an important place in Civil Defense planning.

Mobile Telephone Installations

THE EXPANDED USE of mobile radio telephone equipment in the post-war period has presented our installation team with one of its complex jobs. An example of a mobile customer might be the neighborhood doctor who has found that a mobile telephone in his car is an important service for use in his profession. For various reasons, the doctor changes cars every year—making him typical of our “mobile customer”; for, on the average, every mobile radio telephone set is newly installed each year. Most of the installation procedures are the same—except that radio channels instead of cable pairs are assigned. The installer, however, has many new problems: multi-conductor cables, power leads, and a radio transmitter and



The "OK desk" receives installers' reports of installations completed.

receiver requiring detailed adjustments. An appointment at the garage, a well planned job, and the proper tools have the doctor back on the air and in touch with any of his patients within a couple of hours.

Business Customers

OUR BUSINESS CUSTOMERS' requirements probably bring about the most complex of our installation jobs. These range from the intercommunicating arrangements for small businesses to private branch exchanges big enough to care for a fair-sized town.

These customers have the "move and change" habit, too, contributing their share to the over-all average of two out of five telephones that require installation changes during a year.

Because of the complexity of most of these installations, service engineers are called in to design and plan them. Their

design work, the result of special training, can provide not only the best service for the customer but also the most economical and stable installation.

After negotiations are complete, the service engineer releases information to the business office in order that the service order may be issued.

Not only has negotiation with the customer necessitated special care and attention, but the part played by the supply team, who furnished Mrs. Jones' telephone and the doctor's mobile radio, now becomes more important because of the larger quantities and special types of equipment required.

Now the supply forces are notified about the requirements of any parts not normally carried in their stocks. Special requisitions for these parts are placed on Western Electric in time to permit their delivery to coincide with that of the other items. Most

Teamwork and the Installation Job

of these deliveries are made directly to the customer's new location or to lockers in which the installer keeps his tools.

The installation forces must plan the equipment arrangement of most business customers' service in greater detail, for probably inside wiring cables have replaced wires; cable terminals have replaced the simpler connecting blocks; switchboards and key sets, with buttons to afford access to several lines, have replaced the ordinary telephone. Special arrangements must also be made to provide the power to operate all of this apparatus, since the power that operates the individual telephone is not adequate to meet the new requirements.

Key telephone sets have introduced the most widespread use of complex station installations. In some business areas as many as one out of every five telephones is of this type. In addition to the many more conductors required to serve these telephones, there are perhaps three or more relays per line to be installed and adjusted. Another service feature, dial intercommunication, has also introduced selectors on the premises. The local switching requirements of these key telephone plans have, of course, increased manyfold the effort involved in each installation.

The installers of a private branch exchange, the switchboard that serves so many business houses, hotels, and other



Installation of mobile telephones differs from that of telephones which stay put.

establishments, must not only install telephones but most of the other equipment associated with what is the equivalent of a complete central office building.

Weeks, even months, are required for some of these installations. Business customers cannot afford a moment's loss to their service. Time is on a budget on these jobs, and quite often the week-end is the PBX installer's busiest time. This is both installation and cutover time for some customers.

One Saturday in New York, for instance, Wall Street passersby were surprised to see a new eight-position PBX switchboard hanging over the middle of the street. A survey of the job of relocating a bank's switchboard had revealed that it could not be moved without undue interruption to the service. Studies had also shown that an addition to the board was needed to han-

dle the increased number of calls now being made.

Authorization of a new switchboard by telephone company equipment engineers permitted the relocation job to be carried out with a minimum of interruption to the service. The actual installation effort was further minimized by having the new board assembled in the Western Electric Company distributing-house shop, then delivered to the job, where riggers with a 75-foot boom hoisted this 5-ton piece of equipment to the new third-floor location through a window that allowed only inches to spare.

On a subsequent Saturday the installers, after completing the installation, cut the new board into service.

Not all of our business installations are in metropolitan areas. Those associated with pipe line pumping stations, for

An emergency telephone installation on a levee threatened by flood waters.



example, are usually in rural locations and have complex multi-party lines with equipment provided to allow any one station to signal selectively any other station. The problems posed by distance require even greater attention by installation people to the design of the service, the supplying of material, and the training of the installer.

Installers must be resourceful, for wherever customers go they request telephone service. A mine shaft, where explosion-proof equipment is used, or the emergency outdoor telephone set along the turnpike, all challenge the installer in his job of completing that final important link.

THIS, THEN, is the installation story. Since its beginning, in the days when all installations featured a telephone with a crank on the side, each year has brought new equipment and more variations of older equipment.

As the number of features and services rendered has increased, so have the demand for service and the volume of changes increased. Each new demand for service and each request for a change must be met. No wonder the average telephone is connected, changed, or moved every thirty months.

All this takes an increasing share of the price the customer pays for service and of the share owners' dollars. It becomes increasingly important to our business, there-



An eight-position private branch switchboard weighing five tons is hoisted to the third floor of a bank for installation.

fore, that the problems of installation continue to receive the interested support of all team members. The result of this working together will be greater effectiveness in every operation—which also will permit the clearing of our today's back-logs *today*, so that we may serve our customers upon demand now and in the future.

The aggressive program for selling long distance message service in Michigan, here described, is representative of the programs developed throughout the Bell System

SELLING LONG DISTANCE IN AN OPERATING COMPANY

BERNARD C. BLEISCH

Sales and Service Manager, MICHIGAN BELL TELEPHONE COMPANY

NOTE: In the Spring issue of this Magazine, "Now It Can Be Sold," by Justin J. Murphy, Sales and Servicing Engineer of the A. T. & T. Co., reviewed the broad objectives of the Bell System's sales program—including the sale of long distance service. A description of the operation of the sales program in an Associated Company seems timely now, and we invited Mr. Bleisch to contribute this account of how his company promotes the sale of long distance message service. EDITOR

NOW LONG DISTANCE SERVICE can be sold—and we're selling it!

For the first time since the late 1930's, we have sufficient facilities to sell the use of long distance telephone service. This situation, apparent in the latter part of 1953, resulted from a general readjustment in business activity together with the fact that the System's long distance facilities have been tremendously expanded in post-war years to keep pace with demand.

The receding general business curve means our customers are also selling. This fact, coupled with the long period during and since World War II in which we were not in a position to stimulate long distance usage, finds us with a ready market for our service. Business today is anxious for ideas which will result in a more economi-

cal operation or in increased sales, and through the sound application of long distance service to the customer's business we can make these aims a reality. We ourselves are vitally interested in maintaining and increasing long distance message revenues—which provide approximately one-third of all System revenues.

In Michigan we believe that increased use of long distance service can be best accomplished through a sales and advertising program backed up by the coöperation, interest, and enthusiasm of all departments and employees. Therefore, an interdepartmental committee comprised of vice presidents and department heads was organized to:

acquaint the various departments with the need to stimulate usage,

develop new ideas, and check on the progress of the program.

With complete backing of top management, and through the efforts of all departments, considerable progress has been made in a relatively short period of time.

Employees are being kept informed of the activity through the company magazine, posters on bulletin boards, pocket-size cards containing basic information, and other printed material, and through informational meetings.

The Public Relations Department has prepared a comprehensive program of local advertising to tie in with the national advertising program. This program includes newspaper advertising in both weekly and daily papers, advertisements for trade papers and local magazines, spot announcements and program coverage for radio and television, posters to appear in our public offices, booth cards to be installed at coin telephone locations, exhibits for fairs and shows, and inserts to be included with customer bills. Every appropriate means of carrying our story to telephone users is being explored—and every effective approach utilized.

The Directory Department is including filler ads in the Yellow Pages designed to stimulate the use of long distance service. Long distance rates are again being featured as new directories are printed. Instructions on how to place long distance calls are prominently displayed.

The Traffic Department is conducting extensive educational programs so that their people are aware of the promotional efforts of other departments. Their people talk with customers about long distance service when discussing such items as dialing irregularities, number changes, or dial cutovers.

The Plant Department is encouraging installers and repairmen to discuss long distance service on their regular customer visits. In addition, they are distributing among residence customers a pamphlet containing information on types of calls, rates, and suggestions for various uses of long distance service.

The Commercial Department, along with the Public Relations Department, has the major role in carrying our story to customers and “selling” them on the advantages of long distance service.

In the business office a “Talk Toll” plan has been introduced, and service representatives are trained to be alert for opportunities to talk about long distance service in their 15,000 daily customer contacts. For example, the service representative will point out where appropriate, in contacts when long distance service is discussed, that reduced rates are in effect after 6 P.M. and all day Sundays; station rates are less than person rates; calling by number is faster; a booklet in which to list out of town numbers is available upon request.

We are carrying our story to members of business clubs, trade associations, and other groups. This is done through talks, demonstrations, and film showings designed to highlight long distance telephone service.

Our business and residence customers each contribute about half of our long distance revenues. From a cost standpoint, it is not possible to reach personally all of these customers. Careful market selection, therefore, is necessary.

Sales to Business Customers

SINCE PRE-WAR EXPERIENCE and recent tests indicate that business customers offer the

greatest sales potential for increased usage, particularly those now using substantial amounts of long distance, we are selecting business customers for initial coverage on that basis. Those to be contacted include customers who:

use fifty dollars' worth (or more, excluding taxes) of long distance service a month

have teletypewriter exchange service or intercity private line services

are part of a multi-office operation, such as those having factories, sales offices, branches, or warehouses in several cities.

Contacts with these more promising prospects is the responsibility of a specially trained group of salesmen.

Selling long distance service to business customers is not like selling automobiles, industrial equipment, or household appliances. It is not the same as selling key telephones, key cabinets, or switchboards. Long distance usage has a more intangible quality, and telephone calls are a perishable item. To sell long distance service requires specialized sales treatment by well-trained, competent, and enthusiastic salesmen.

Nearly 400 Profitable Uses

THE LONG DISTANCE SALES PLAN our salesmen use was developed by studying how different business and industrial concerns were using long distance service and what benefits they were getting from it. As a result of those reviews, the System accumulated valuable information about the operation of a great many types of businesses and their use of long distance service. Nearly 400 individual uses of long distance service that have proven profitable in business operation have been catalogued. Our plan is to show other custom-

ers how they, too, can benefit by adopting these usages in their operations.

Work with customers whose business operations cover several states involves not only our salesmen but the coordinating efforts of the Long Lines Department of A. T. & T. and the assistance of salesmen from the Associated Companies in whose territories our customers operate.

The success we have experienced in helping customers to save money and increase sales through the use of long distance is illustrated by some of our recent cases. They range from the largest manufacturing companies to small retail merchants.

Here are a few highlights from recent sales.

Steel companies have been among the most receptive customers in adopting our suggestions for effective planned usage of long distance service. For example:

¶ *The Keytown and Skipstop Plans:* Using the keytown plan, the salesman calls his customers in the area surrounding a town in which he has established temporary headquarters. The skipstop plan affords wider market coverage and more frequent visits with customers through the alternate use of personal and telephone visits. The steel company's salesman so organizes his route that on one trip he visits one group of customers personally while reaching a second group by long distance from nearby towns. On his next trip he reverses the procedure.

¶ *Enterprise (Special Reversed Charge) Service.* In the interest of extending their market coverage to towns surrounding their sales office and warehouse locations, a number of steel companies have initiated the use of this service. Enterprise service provides them with representation in the telephone directories of the selected cities

and extends free calling privileges to their customers.

¶ *Following-Up Customer Initiated Orders.* To assure maximum sales to customers ordering by mail, several steel companies are calling by long distance all customers who place such orders, to thank them for their business, suggest additional items, increase orders to standard lots.

Other usages adopted include collect call plans, thanking new customers for their business, and checking credit limitations with the home office. All these usages add up to increased sales through extended market coverage and more thorough servicing and sales coverage of existing customers.

¶ The officers of a national wholesale trade association were so impressed with results from the recent use of sequence calling lists by some of their Michigan members that they have provided space in their magazine without charge for a description of this service to their more than 10,000 members.

¶ A popular dancing school is combating the problem of establishing costly suburban branches by using "Enterprise" service in nearby towns. An extensive radio and newspaper campaign, advertising their business, encourages prospective clients to call, without charge, the Enterprise number in their area to arrange an appointment or obtain information.

¶ A bank president has agreed that his Foreign Banking Department can increase their business and offer a personal executive touch by supplementing mail and cablegram messages with overseas telephone calls to England and France.

¶ A customer operating a large truck fleet, and planning to expand into a new market area, was sold on accepting collect



This display, for use at public gatherings, emphasizes how much customers are likely to overestimate the cost of long distance calls.

calls from that area from any of his customers concerning:

- additions to or deletions from delivery orders,
- changes in shipping schedules,
- claims for damages,
- miscellaneous servicing calls.

To help advertise this plan and to solicit new business, "stickers" indicating a willingness to accept collect calls are being attached to mailing pieces. In addition, an attractive poster showing a man talking over the telephone and a line of type saying, "Don't delay, phone today. We'll pay the charges" is being distributed to their existing and potential customers.

¶ A well-known real estate broker specializing in purchases and sales of large office buildings has increased his use of long distance service in conducting negotiations in which split-second timing may involve millions of dollars. He also anticipates using long distance conference serv-

ice to consult with the directors in his company who live in several different cities.

¶ One of the major meat packers was planning on introducing prepared "pork and veal chopettes" to their retail outlets. As first planned, these attractive frozen packages were to be announced by means of post cards with a tear-off section to be filled out and returned as an order. The customer was convinced of the advantage

of sending out the announcement with an invitation to call collect for packaging and price information. By opening their telephone door in this manner, the company afforded their salesmen the opportunity to increase the variety and size of orders. In addition, store displays advertising these new products could be recommended and made available to the retail stores as appropriate.

A sales poster in the making. Such promotion pieces remind employees that every customer contact offers a chance to "sell long distance."



Selling Long Distance

¶ A national oil company is utilizing systematic long distance conference service to get in touch with all division offices on a regional basis to discuss price changes, current results, and general policy matters. This usage will be a time saving substitute for mail and field trips, as well as adding the personal stimulation of a direct word from the home office.

¶ A jewelry manufacturer adopted a plan of collecting overdue bills by long distance telephone after a two-day trial netted him highly profitable results.

These cases and hundreds of others indicate the salability of long distance service, and we believe we have the formula

for turning sales opportunities into sales success. Our answer to effective selling of long distance service is company-wide co-operation.

The Public Relations man creates advertisements which are appealing, informative, and action-stimulating to our customers. The service representative is alert to opportunities to "talk" long distance usage on her numerous customer contacts. The Plant man provides and maintains the necessary equipment and service, and "talks" long distance on his many contact opportunities. The Traffic operator continues to give the fast, top quality service which causes customers to buy again.

Television "commercials" on Michigan stations remind people of the convenience and satisfaction to be found in long distance calls.





Sales interviews such as this, between a Detroit banker and a Michigan Bell salesman, emphasize the business economics of overseas telephone calls.

The salesman, armed with the best product of its kind in the world, supported by all departments and all employees, knows

that long distance service can be sold to our business customers and that he can sell it—and he does!

Who's Who & What's What

I N T H I S I S S U E



Executive V.P.: Hal S. Dumas

COURTESY is a genuine quality in all telephone people nowadays. There is a tradition, however, that courtesy is particularly ingrained among people of the South, and it is for that reason, as well as because he is executive vice president of the A. T. & T. Co., that we asked HAL S. DUMAS to contribute this issue's "guest editorial" on the place and importance of courtesy in the telephone business. Born in Georgia, Mr. Dumas devoted 40 years of his life to the Southern Bell Telephone and Tele-

graph Company—eight of those years as its president. He started in Atlanta as a trouble man, moved to greater and greater responsibilities through the Traffic, Plant, and Executive Departments, and reached the top in 1943. Then the scene changed radically with his election to his present post in 1951. As executive vice president he assists the president in the general administration of the business, and acts for him in his absence. Said this MAGAZINE of Mr. Dumas two years ago, "System executives who seek his counsel find it flavored with ripe judgment."

WHEN EUGENE J. MCNEELY contributed an introduction to an article "Benefits and

O. & E. Head: Eugene J. McNeely





Assistant Chief Engineer: Charles M. Mapes

Pensions Have Proved Value for 40 Years," which appeared in this *MAGAZINE* just a year ago, he was A. T. & T. Vice President in charge of the Personnel Relations Department. It is as Vice President in charge of the Department of Operation and Engineering since January 1 of this year that he contributes the introduction to this issue's "Emergency Mobilization and the Bell Telephone System." Starting as a student engineer with the Southwestern Bell Telephone Company, he held various craft and engineering jobs leading through posts of increasing responsibility to that of district plant superintendent in 1932, division plant superintendent in 1935, and general plant personnel supervisor in 1941. He became Area plant superintendent in 1944, and general plant manager of the company in 1947. The following year he moved to New York as an assistant vice president in the A. T. & T. Personnel Relations Department. In January 1949 he was elected

Vice President (Operations) of the Northwestern Bell Telephone Company, and in December of that year he was elected president of the company. In 1952 he received his Personnel appointment, in which he continued through 1953.

THE BELL SYSTEM career of CHARLES M. MAPES, which began in 1923 in the old Department of Development and Research of the A. T. & T. Co., led straight to the assembly room in Washington where, on June 9, he delivered an illustrated talk on the Bell System's defense capacities before a group of top-ranking officials who are concerned with the vital matter of defending this country. For all the intervening years have been spent in ever-broadening phases of plant and engineering work—including three years with the Bell Telephone Company of Pennsylvania in Pittsburgh as general plant supervisor—up to his logical appointment in 1951 as defense activities engineer. In this post he was made responsible for coordinating activi-



On the Defense Team: Cole A. Armstrong

ties within the O. and E. Department relating to the national defense. This was followed in July of 1952 by promotion to his present post of A. T. & T. assistant chief engineer.

SUCCEEDING Mr. Mapes as defense activities engineer was COLE A. ARMSTRONG. And although the latter no longer bears that title, he was active in preparation of the material from which Mr. Mapes spoke, and accompanied him to Washington. His telephone career began when he joined the New York Telephone Company as Traffic student in 1929. He was occupied with various Traffic responsibilities until he entered the Navy in 1942—from which he was released in 1945 with the rank of Commander. He then returned to the Traffic Department of the New York Company. Three years later he transferred to the Traffic section of A. T. & T.'s O. and E. Department, and in 1950 he became serv-



Installation Planner: Blaine Hoover, Jr.

ice protection engineer in the Defense Activities section. Since 1953 his title has been that of customer equipment engineer.

FREDRIC M. BIATHROW joined the Accounting Department of the New York Telephone Company in 1929. There, staff and field assignments on revenue accounting work in that company's Long Island Area brought him experience in this branch of the accounting job. In 1946, he transferred to the Operations Division of the Comptroller's Department of the A. T. & T. Company, where he was engaged in developing methods for the sorting of toll and local message tickets. The results of these activities were recounted in the Autumn 1948 issue of this MAGAZINE in an article entitled, "Sorting Two-and-a-Half Billion Tickets a Year." Assignments as group supervisor for revenue accounting methods and later for office organization preceded his present position as head of the group handling fundamental developments in the field of mechanization. This group, in



Crystal Gazer: Fredric M. Biathrow

addition to being responsible for AMA matters, has been concerned with developing a long-range plan for handling the Accounting Department's work which looks beyond the mechanization possible with mechanical equipment now available. His article in this issue describes the general nature of the program which is now getting under way.

BLAINE HOOVER, JR., STARTED his career with the Bell System in the Illinois Bell Telephone Company at Chicago as a splicer's helper in 1939. He filled various outside plant craft assignments until appointed assistant plant engineer in 1940. He entered the Army in 1941, served in the China Burma India theatre for two and one-half years as a Lieutenant Colo-

nel, and was awarded a bronze star medal for his communications services. He returned to the Illinois Company as an engineer in the Plant Engineering Department, and shortly thereafter transferred to the Chief Engineer's organization. In 1948 he participated in the O. & E. Department's study of cable utilization. He returned to Illinois, and was appointed District Plant Engineer and, in 1950, District Plant Superintendent. Since his return to the O. & E. Department in 1951 he has held several assignments in the Plant Division in intercity and exchange maintenance and installation. In preparation of his article he had the help of the exchange service group, including Harlie L. Beagle, the chairman of the interdepartmental service order committee.



Sales Stimulator: Bernard C. Bleisch

THE RECENT LEVELING OFF of long distance messages and revenues has opened the door to a program of active stimulation of this service. As sales and service manager with the Michigan Bell Telephone Company, BERNARD C. BLEISCH has been instrumental in organizing and directing his company's current program of sales promotion of long distance service. Starting in the Plant Department in 1941, and serving three years in the Army Air Force, he was transferred to the Commercial Department in 1946. Since that time he has held a variety of sales line and staff assignments including sales supervisor, toll and teletype; sales supervisor, PBX; sales training supervisor; sales methods supervisor; and sales results supervisor.

HEADQUARTERS SUMMARY

March 15 to
June 15, 1954

THE SECOND JOINT MEETING of Headquarters groups with the United States Independent Telephone Association's technical subcommittee on Operator and Customer Toll Dialing was held in April. Independent telephone operating and manufacturing people throughout the country submit their technical questions concerning nationwide dialing to the USITA subcommittee. This material, after consolidation by the subcommittee, forms the basis for the discussions. Some 70 items relating to the technical engineering and operating phases of nationwide dialing were discussed at the April meeting.

A SPECIAL STUDY is being made by the O. & E. Department and Bell Laboratories of certain elements of the station maintenance job which have a substantial bearing on service and expense. Currently the Companies are spending over \$150,000,000 annually on the maintenance and shop repair of station equipment. This study will include a review of methods and costs involved in handling reports of trouble, and a review of adequacy of test equipment, tools, and field instructions.

Determination will be made in more specific detail than at present available of the underlying causes for equipment and apparatus troubles and whether it is possible to improve the inherent reliability of products through changes in design. A critical study will be made of the amount of repair work desirable on station apparatus returned to Distributing House shops in order to assure satisfactory performance when it is returned to the telephone companies.

FOR THE FIRST TIME since its inception in 1917, the general contract between the United States Coast Guard and each of the Bell companies involved has been amended. This contract, designed to insure the best possible service for the Coast Guard in connection with its administrative and emergency operations, covers both the furnishing of facilities and service and the interconnection of Coast Guard facilities along the coast and the telephone companies' network. For the past 37 years the contract has required the maintaining currently of detailed information showing

the services and equipment furnished at each location, rates and charges applicable, and other related data. The amendment, effective July 1, 1954, eliminates this burdensome routine, and makes possible the introduction of simplified procedures for the handling of orders and billing for Coast Guard communication services. Substantial savings will result to both the Coast Guard and the companies.

KEEPING THE BELL SYSTEM's centralized pool of liquid funds invested in U. S. short-term obligations has always been an important job for the Treasury people at A. T. & T. Headquarters. It has been an unusually active one in recent months, with the pool raised to nearly one billion dollars by the proceeds from the \$600,000,000 A. T. & T. convertible debenture issue. It was necessary to get these new funds advantageously invested on a maturity schedule that would fit in with the estimated timing of Bell System needs. Handling the centralized pool for 1953 involved 2,200 separate transactions with Associated Companies and 600 separate transactions with government bond dealers. The average annual rate of return on temporary investments was 2.07 per cent for the year.

CONVERSIONS OF A. T. & T. debentures into stock exceeded \$400,000,000 during the first half of 1954. It was the busiest six months of conversion activity in the financial history of the company. The new Convertible 3½s of 1965, which were issued last December and became convertible on February 9, accounted for more than 90 per cent of the debentures converted. The result has been to reduce the debt ratio of the Bell System to 38 per cent, the lowest level since inauguration of our post-war financing in 1946. Only \$326,000,000 of the four existing A. T. & T. convertible issues remained outstanding at the end of June, representing less than 18 per cent of the original amounts issued. More than a third of the converting of these issues to date has been due to arbitrage transactions, that is, the concurrent buying of debentures and sale of stock on the market by professionals who convert the debentures and deliver the resulting stock to the purchasers.

A NEW TYPE of coaxial cable system, capable of transmitting more than 5,000 telephone conversations simultaneously, was opened for service between New York and Chicago, via Philadelphia and Cleveland, late in March. It took a year and \$10,000,000 to convert the coaxial cable on this route—which handles the heaviest public and commercial communications traffic in the country—to the new-type facilities, known as L-3. One hundred twenty amplifying stations established at eight-mile intervals along the route had to be equipped and an additional 120 stations, placed half way between those already in operation, had to be constructed and equipped. With the L-3 coaxial system, it is possible to transmit more than 1,800 conversations simultaneously over a pair of coaxial tubes, or to carry 600 telephone conversations and two television programs—one in each direction—at the same time.

RECENT EXTENSIONS of long distance dialing include the cutover in June of a 4A toll crossbar system at Richmond, Va., and introduction in recent weeks of nation-wide dialing for customers in a suburb of Detroit—the second Detroit suburb to have this service—and in four suburbs of Washington, D. C. Richmond was the 28th city to have a toll crossbar system. Four more systems of this type will go into service this year. Some 3,000 cities and towns are now on the toll dialing network. Over half of the toll board calls are dialed through to completion by outward operators.

“Foreign area” customer dialing is now available to about 75,000 customers in eight localities. These customers can dial about 13,000,000 telephones in a number of metropolitan areas from coast to coast. During the last half of the year this service will be opened up for customers in 15 additional localities.

THE NUMBER OF television stations in the nation to receive service over the Bell System television network climbed to 300 in May when Station KWNH-TV, Kingston, N. Y., was added to these nationwide facilities. As of June 15, almost 200 cities in the United States were receiving television programs over the Bell System network. Some 55,000 channel miles of radio relay and coaxial cable circuits are now available to provide this network service. Six years ago in May, when network television was inaugurated commercially, there were fewer than 1,000 miles of television channels in operation.

A SOLAR BATTERY—the first successful device to convert useful amounts of the sun's energy directly and efficiently into electricity—was demonstrated at Bell Telephone Laboratories last April. Scientists there, with an amazingly simple-looking apparatus made of strips of silicon, showed how the sun's rays could be used to power the transmission of voices over telephone wires. The Bell solar battery also used energy from the sun to power a transistor radio transmitter carrying both speech and music.

Bell Laboratories reported that it was able to achieve a six per cent efficiency in converting sunlight directly into electricity. This compares favorably with the efficiency of steam and gasoline engines, in contrast with other photoelectric devices which have never been rated higher than one per cent. With improved techniques the Bell Laboratories scientists say they expect to increase this efficiency substantially. Nothing is consumed or destroyed in the energy conversion process and there are no moving parts, so the Bell solar battery should theoretically last indefinitely.

Although work is still in the laboratory stage, actual use of the solar battery in the telephone business is a strong possibility.

WESTERN ELECTRIC recently signed a new contract at the request of the Atomic Energy Commission to continue operation of the A.E.C.'s Sandia Laboratory at Albuquerque, New Mexico, until the end of 1958. Since 1949 the work of development, design, engineering, and prototype production of atomic weapons there has been under the direction of technical experts from Western Electric and the Bell Laboratories. This work is being handled for the government by the Bell System on a non-profit basis.

THE NUMBER OF FIRMS licensed by Western Electric to manufacture and sell transistors has now reached 43, including 28 domestic and 15 foreign companies. In addition, more than 500 firms are licensed by Western to produce and sell equipment containing circuits developed by the Bell Laboratories in which transistors may be used. Among the variety of products now on the market in which the transistor can be found are hearing aids, an electric eye counting device, a microphone with a built-in transistor pre-amplifier, and a sound pick-up for 16-mm. motion picture projectors.

The Blue Pencil



JUST ABOUT EVERY MAIL brings to the editor's desk some "telephone magazine," either of Bell System production or of some other telephone organization here or abroad. All are interesting—to one at this location, at any rate. A publication from "the other side" is the *Telecommunications Journal* of the Post Office of the United Kingdom—which, as you know, handles not only mail but the telegraph and telephone services in that country. In the May-June 1954 issue appears an article entitled "Service to Subscribers in the United States," based on a report published by the British Productivity Council, which presents an interesting viewpoint—not to say flavor. The opening statement that "Though the title of this article may appear to be general, the operative word is *Service*" is followed by descriptions of many American operating practices—not all of them accepted without reservation. Of broadest interest, perhaps, is the concluding paragraph, which bears the heading "The Meaning of Service":

"These aspects of the American telephone business reveal how the companies think of service as something personal rather than numerical or even standard. In this respect their outlook is the same as that throughout American business where the personal satisfaction of the customer is the paramount consideration. To get an idea of how the telephone subscriber judges the administration it may be useful to work out how you judge 'service' at a retail shop. The shop you select as giving the best service is not necessarily the cheapest or the one with the largest range of goods. It is the one that welcomes you as an individual, that tries to avoid forcing on you what the shop assistant thinks you ought to have, whether you want it or not; it is the shop that may sometimes make mistakes in the goods or in giving change but repairs the error with such grace and sincere apology that your complaints are turned into appreciation. These things may not be revealed by statistics, but they do determine the answer to the question—'are you satisfied with the service or not?' There is a great deal behind the Bell System slogan—*'Service—that's what we Sell.'*"

If those are British conclusions of American objectives, they seem like pretty sound ones.

ALMOST THE ENTIRE COMMUNITY of Nitro, W. Va., turned out last June 10 to witness a parade in honor of Mrs. Susie Toler and help observe "Susie Toler Day." She was the guest of honor at a banquet of 300 friends and associates, and was presented the symbolic "key to the city."

For June 10 was Mrs. Toler's birthday, and on that day she retired from the telephone industry after 51 years of service. More particularly, the last 25 years of that half-century-plus of service had been spent at the switchboard in Nitro, and the citizens of that community wanted to show their appreciation.

Mayor Alexander made it official with a proclamation which said, in part:

"WHEREAS, the people of Nitro realize that no one is more deserving of such honor than this woman who has served the community so well at the local telephone switchboard for these many years and whose retirement will, in a sense, mark the end of an era of personal telephone service; and—

"WHEREAS, it is only fitting that one who has met the needs of the public so long and so faithfully should be recognized by the people of the community she has served;

"THEREFORE, I, W. W. Alexander, Mayor of the City of Nitro, do hereby officially proclaim next Thursday, June 10 as "Susie Toler Day" and do earnestly urge each of our citizens to join in this tribute to a public-spirited citizen whose devotion has been displayed through long years of untiring service."

"W. W. ALEXANDER, Mayor"

Many another telephone operator may deserve such recognition—but few get it in just this way.

DISTRIBUTION of new telephone directories in cities is always the occasion for the preparation of "press releases" for daily newspapers, for the general and desirable information of the public about the event and how it proceeds. As the task rolls its repetitive round over the years, it becomes a bit of a chore within the Public Relations Departments of the Associated Companies, and efforts have been made now and again to give the "releases" a fresh touch. The copy writer at the New York Telephone Company who concluded his this Spring's assignment this way seems to have struck a new note:

"Distribution of each issue of the new Manhattan book, invariably bigger in circulation than the preceding one, causes the telephone company's slide-rulers and mathematicians to break out in their seasonal rash of easily-forgotten statistics. For instance, among other facts that don't really matter, it can be stated without fear of confirmation that the new Manhattan book contains 780,000 listings on 1,800 pages and uses up 4,000 tons of paper, 13,000 gallons of ink and 5,000 gallons of glue; and that last figure is one the statisticians are always stuck with. A veteran telephone mathematician was responsible for the incontrovertible statistical conclusions that if all the Manhattan telephone books were piled one above the other they probably would topple over, plus the irrefutable finding that if they were all placed end-to-end it would be a ridiculous waste of labor.

"Donnelley Corp's 600 carriers are expected to walk a total of several miles and climb goodness knows how many stairs (this is one that all the statisticians flunked) on their Manhattan directory delivery. It is estimated this huge task will take 12 days. The carriers have identification cards which they will show on request to those telephone customers who are justifiably suspicious of strangers who want to trade them new books for old ones."

SURE-FIRE ILLUSTRATIONS, according to an advertising axiom, are pretty girls, babies, and animals—in that order. Whether the second category includes advertisements *by* children we don't know. But last April's A. T. & T. advertisement in national magazines, reproducing comments written by grade-school children on the value of the telephone, apparently rang the bell—or several of them. One trade journal in the advertising field devoted a page to a reproduction of the ad, and commented—"a breath of fresh air," adding that "Today, when all advertising is so professional . . . it is heartening to see copy of this sort." And a newspaper columnist in British Columbia described it as "everything that advertising should be: truthful, effective, eye-catching, and extremely well written." Yet it originated simply as a by-product of the Bell System's efforts to fulfill its obligation to teach the upcoming generations how to use effectively a tool of modern living. Such comments make pleasant reading, though—even on the sidelines where we sit.

THE COVER of this issue, with its Traffic theme, is reproduced from an original etching done for this magazine by Federico Castellon. To illustrate the continued importance of the operator in a world of increasing mechanization, Mr. Castellon chose a D.S.A. (dial system "A") switchboard in New York City for his setting, and shows operators and a service assistant as he found them there. Born in Almeria, Spain, he was brought to this country as a child, and is proud now of his American citizenship. One of the country's leading etchers, his early training included a fellowship from the Spanish Republic, and he has twice been a Guggenheim Fellow. Collections of his work hang in galleries and museums from coast to coast, his one-man shows have been seen from Bombay and Madrid to New York and San Francisco, and among his trophies are first prize in etching by the Associated American Artists and first prize for intaglio print by the Library of Congress. Mr. Castellon is painter, illustrator, and instructor in the fine arts as well, and seems to be somewhat of a cosmopolite, since in World War II he served with the O.S.S. in the China Theatre.

AS WAS THE CASE with Mr. Gorsline's "Behind the Scenes" etching on last Spring's cover, a reproduction of Mr. Castellon's "Voices with a Smile," minus printing and suitable for framing, is available to any telephone man or woman who will ask the editor for it. A few of the former are still on hand, and other etchings are to come. It looks as though anyone sufficiently devoted to this business might build for himself—or herself—a "Bell Telephone Magazine Collection."

BUSY AMERICANS, including busy telephone people, are likely to take their periodical reading-matter pretty much for granted—even as you and I. It is gratifying, then, that more than two-score readers, friends and strangers, in the telephone business and out of it, took the trouble to comment favorably of the "new look" they found in last Spring's issue of this MAGAZINE. Of the several variations on that general theme, we liked particularly the reference to keeping the cake and changing the icing, since this comes close to what we were trying to do—and apparently the flavor of the frosting has improved. To all these people we extend out greetings and cordial thanks. Such things are a reward of the editorial task—a heartening experience.

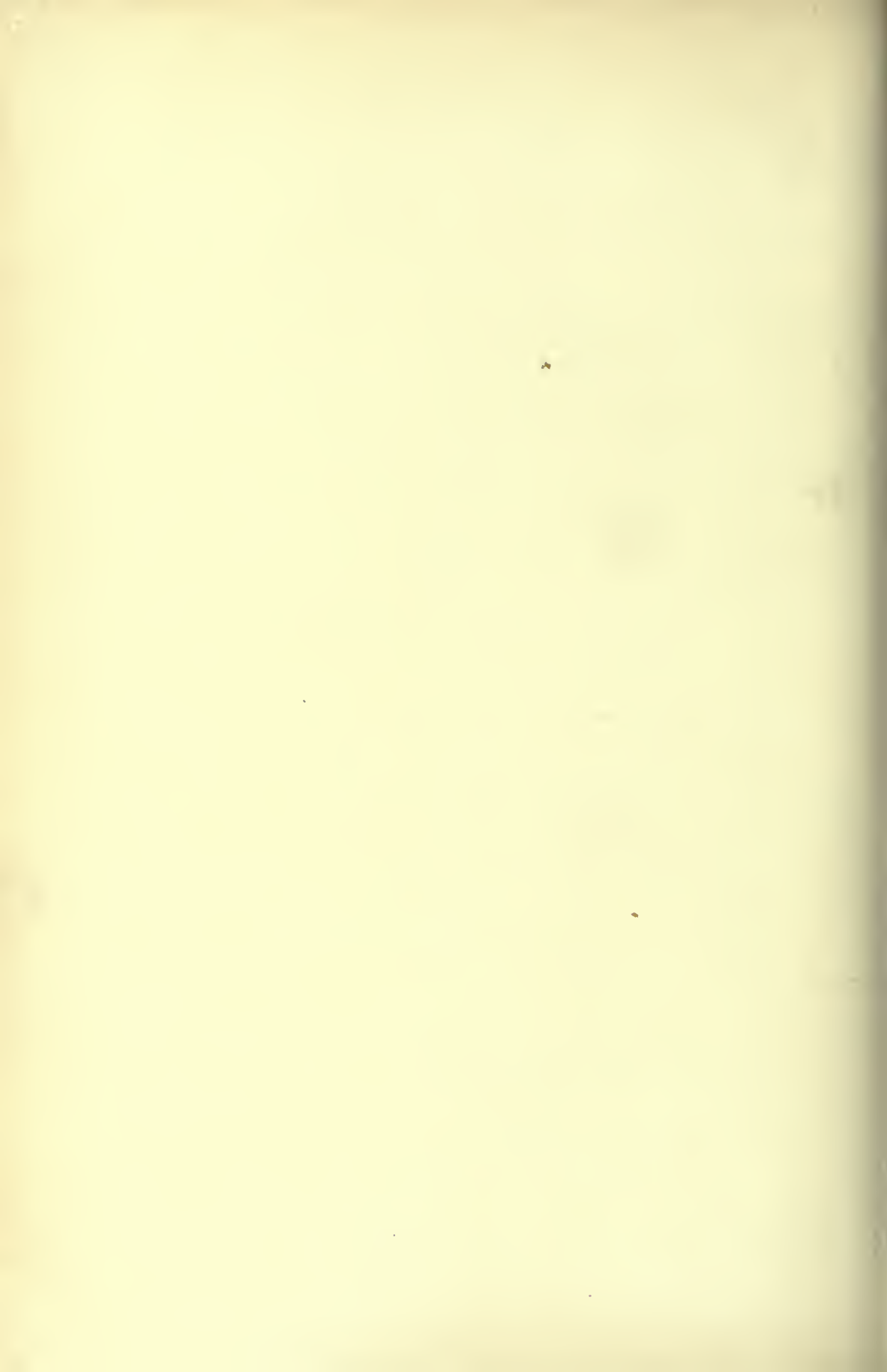
Bell Telephone MAGAZINE

AUTUMN 1954



Carl M. Schulzkeiss

ACCOUNTING OPERATIONS: People and Diversified Equipment





Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: "Accounting Operations: People and Diversified Equipment." From an original etching of Accounting girls at various operations, executed for this MAGAZINE

Carl M. Schultheiss

The Northeast Withstands Successive Batterings 138

Selling Our Customers Everything They Need 154

Eugene J. McNeely

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JUDSON S. BRADLEY, *Editor*

Published for the Bell System by the Public Relations Department, American Telephone and Telegraph Company, 195 Broadway, New York 7, N. Y.

CLEO F. CRAIG, *President*

S. WHITNEY LANDON, *Secretary*

JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

IN THIS ISSUE



O. & E. Vice President: Eugene J. McNeely

THE TELEPHONE CAREER of A. T. and T. Vice President EUGENE J. McNEELY was described in the previous (Summer 1954) issue of this MAGAZINE, which carried his introduction to the important statement on "Emergency Mobilization and the Bell System."

AS OUTSIDE PLANT ENGINEER of A. T. & T. Co., CHARLES G. SINCLAIR, JR., has been well aware of the post-war growth of this country's highways and byways, and much concerned over the effect on telephone construction and reconstruction. Mr. Sin-

clair joined the Engineering Department of the New York Telephone Company in 1913, became a group head there in 1917, and transferred to A. T. & T. in 1921 as a group head in the Engineering Division of the O. and E. Department. His first responsibility was for underground construction, splicing and testing. Subsequently he was placed in charge of construction, maintenance and tools, and has held his present post since 1948. His most recent previous contribution to this MAGAZINE was "Exchange Cable: The Drama of Post-war Production," in the issue for Summer 1948.

Outside Plant Engineer: Charles G. Sinclair Jr.





Information supervisor: R. S. Callvert

CREATOR of the brochure referred to in and bearing the same title as this article, R. S. CALLVERT has been for more than two years information supervisor in the Public Relations Department of the A. T. & T. Co. After study, newspaper work, and public relations experience on the West Coast, where he was born, Mr. Callvert joined the Bell System in 1941 as publicity representative at the Western Electric Company's Hawthorne Works in Chicago, and subsequently became editor of the employee publication there. In 1946 he moved East to Western's headquarters in New York, where he was appointed publications supervisor. A member of the *publications* group of the A. T. & T. department when he wrote his contribution to this issue, Mr. Callvert transferred to the *employee information* group on October 1.

STARTING AS AN OPERATOR in New Jersey in 1916, MARGARET E. FAWCETT worked up through the lines of organization to be

a chief operator. When the New Jersey Bell Telephone Company was organized in 1927 she was appointed to the staff of the general traffic supervisor, while retaining the title of chief operator and working with the chief operators in various New Jersey offices. In 1928 she joined the traffic division of A. T. and T.'s O. and E. Department. Here she has worked on operator training plans, employment problems, and on central office management training. Last year her title was changed to traffic induction and development engineer, and—appropriately enough—her responsibilities now concern more particularly the development of chief operators and assistant chief operators, their induction into the ranks of management, and the induction of new employees into the traffic organization. She has contributed several articles to this MAGAZINE: most recently “Service Executives: The System’s Chief Operators” in the Autumn 1952 issue.

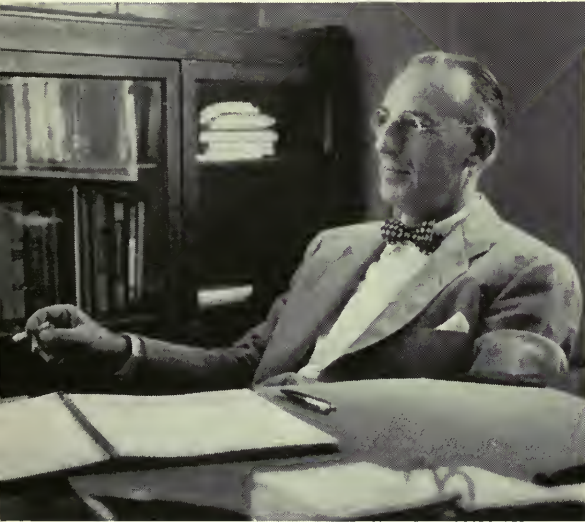


Smiling traffic engineer: Margaret E. Fawcett

THE TITLE originally proposed—“Born in Baltimore”—for the article which begins on page 169 applied not only to the system of telephone education there but to the

authors, Messrs. E. DUNCAN HYDE and CHAUNCEY R. TATUM, both of whom are natives of that city.

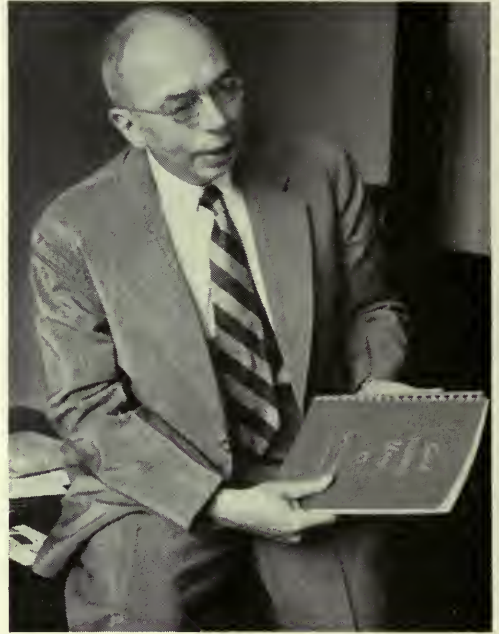
Mr. Hyde joined the Baltimore public school system in 1930 after having worked for a short time as an accountant—accounting having been his college major. He served successively as business teacher, department head, and, for the past ten years, as supervisor of business education. During this period he has also taught evening adult classes in the city schools and teacher-training classes at the University



Educator: E. Duncan Hyde

of Maryland. He has contributed a number of articles to professional magazines and holds membership in various professional societies and associations, including the National Office Management Association, of which he is a director.

Mr. Tatum joined the Commercial Department of the Chesapeake & Potomac Telephone Company of Baltimore City in 1928 after some years' experience in outside financial and accounting work. He has served as business office manager and commercial engineer, and since 1945 has



*Customer Relations specialist:
Chauncey R. Tatum*

specialized in educational and lecture-demonstration activities in the customer relations group in the Commercial Department of the Baltimore Company. As early as 1936 Mr. Tatum was designated a member—and was subsequently chairman—of the guidance advisory committee of Balti-

At the wheel: Frederick K. Glynn



more's Department of Education. He has served as visiting lecturer in commercial communications at the Naval Postgraduate School at Annapolis, has lectured on audio-visual materials at the University of Baltimore, and since 1953 has served as instructor in public relations in McCoy College of Johns Hopkins University.

SERVICE IN THE radio division of the Army Signal Corps led FREDERICK K. GLYNN in 1919 to the Western Electric Company, where he worked on "wireless" equipment for a year. Then he moved to the New York

Telephone Company for a term in the construction tools and equipment laboratory. Tools and equipment led toward his long-term objective of working with motor vehicles, and he reached it in 1923, when he became the New York Company's engineer of motor vehicles. Since 1925 he has been automotive engineer in the plant operations division of the O. and E. Department of A. T. & T. Co. The accompanying photograph shows Mr. Glynn at the wheel—but it is the wheel of the Glynn cruiser, aboard which he and Mrs. Glynn live for about six months of the year.



*Bell System resources, experience, recuperative strength
make possible prompt restoration of service after two
vicious hurricanes smite telephone companies*

THE NORTHEAST WITH- STANDS SUCCESSIVE BATTERINGS

THE HURRICANES which struck the northeastern states successive blows on August 31 and September 11, 1954, combined to put more telephones out of order than did either of the disastrous hurricanes of 1938 and 1944. While the parallel did not hold for all elements of telephone destruction and restoration, the damage caused by the recent storms was hideous, the dollar cost was staggering, and only the resources of the Bell System in men and materials and money and skill made possible the miracle of restoration—which had been completed long before this account appears in type.

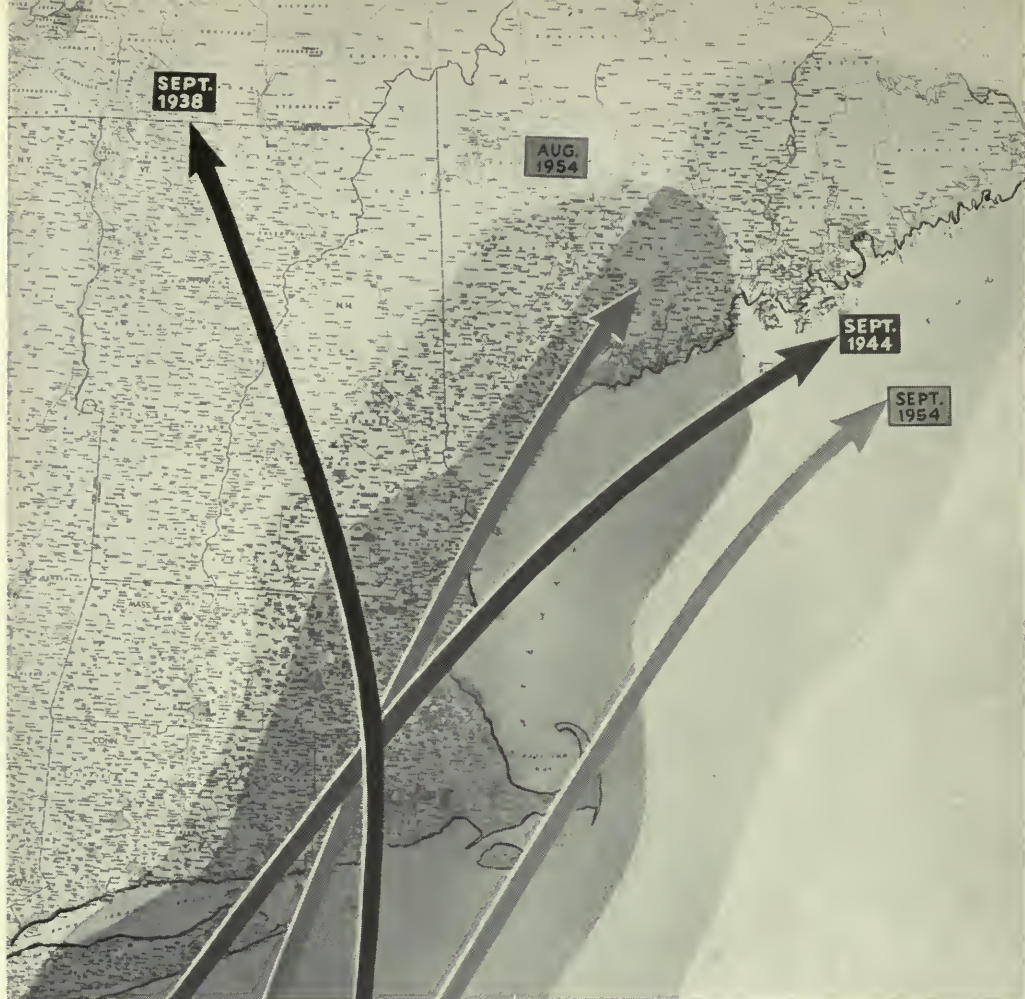
Any catastrophe of such proportions, with its train of death and destruction and its aftermath of wreckage and muck and loss, is a grim and heartbreaking business. From the telephone standpoint, this Autumn's blows were particularly disheartening because of their repetitive occurrence. For the 334,000 telephones put out of service on August 31 were well on the way to complete restoration when severe thunderstorms in much of the New England area knocked out over 50,000 more telephones—many of them only just restored to service. And on the heels of this came the September 11 hurricane, whose 295,000 newly

“dead” telephones included still others which had only then been restored to usefulness.

THE AUGUST HURRICANE had been spotted in the Caribbean and tracked as it progressed slowly in a generally northeasterly direction. Then, on the last day of the month, its tempo changed. It charged across Long Island—with the back of its hand to New Jersey and New York City—and broke upon New England in the area where Connecticut and Rhode Island adjoin. As it proceeded on across Massachusetts and New Hampshire and swung through Maine's seaward edge, crashing trees and radio towers and church steeples inevitably recalled the tragedy of 1938.

It was principally in the territory of the New England Telephone and Telegraph Company that the damage was heaviest—and New England people are experienced in hurricanes by now. Even as their own 5,000 men brought their skill and equipment to bear on the vast task of clean-up and repair, while Western Electric shipped supplies in a steady flow, the established pattern of disaster relief summoned ready help from beyond New England's borders.

Opposite: Long Lines lineman from Plattsburg, N. Y., runs new wire in Brownfield, Maine, to restore hurricane damage.



Arrows showing the approximate course of the "eyes" of these four hurricanes can convey nothing of their extent or their stupendous power. The shaded portion indicates only the area of devastating force of the two hurricanes of 1954.

Five Bell Companies sent men—pronto: New York, New Jersey, Pennsylvania, and the Chesapeake and Potomac Companies of Baltimore and Washington. They came overland. 1,650 men in a great fleet of 900 vehicles—many driving all night to reach the hard-hit cities and towns widely spread throughout the territory.

They knew what to do, visitors and New Englanders alike, and made rapid progress in the restoration of service. Within three days they had put all isolated central offices back on the map and had breathed life into half and more of the out-of-service telephones. Full restoration was in sight,

and about half the visitors had headed home—when the hurricane of September 11 bore down on places and people only just recovering from the previous attack.

This second hurricane was different: bigger, rougher. It had been traced as it roared straight at New York and New England. A. T. & T. in New York City had set up a control center to work with the New England Company's in Boston, and again warned sister companies to stand by for calls for help. Meanwhile, the storm thrashed eastward past the tip of Long Island and along the Atlantic shore, its wind and waves battering the coastal re-

The Northeast Withstands Successive Batterings

gion till it reached Eastport, Maine, and thence moved on into Canada's Maritime Provinces.

Even before this second blow had been felt in force, more convoys were rolling to the scene. Recruits from New Jersey, Pennsylvania and Long Lines were followed on Sunday and Monday by men from the New York and Southern New England companies, which had by then caught their breath after a fast clean-up of their own troubles. And from Detroit, a 90-car freight train of Michigan Bell trucks and eight sleeping cars of Michigan Bell men rode the rails to New England. For the September hurricane left in its wake nearly 300,000 telephone out of order—as one measure of its destructive force.

THE AUTUMN HURRICANES OF 1954 are things of the past by now. Their challenges were met and overcome, as others have been and still others will be, by the Bell System's skilled and loyal people; by its

material resources (Western Electric shipped supplies into the storm area from 87 points in 22 states, for instance); and by the administrative ability which knows how and where to direct these great assets to the most effective ends.

Words can do little to convey the realities of such terrible experiences as have shaken the northeastern part of our country this Fall. They have been effective, however, in conveying many kinds of thanks: of the New England Company for help received; of customers and business people throughout the whole area for prompt and untiring efforts to get their service going again; of newspapers to the telephone companies for valiant steps in behalf of a large segment of the region's population. All these words are supplemented, made vivid and alive, by what the next dozen pages show about the happenings of two dreadful weeks in early Autumn.

New England Hurricanes

	1938 September	1944 September	1954 August	1954 September
<i>Service Interrupted</i>				
Telephones	597,000	414,000	334,000	295,000
Long Distance Circuits	—	1,000+	1,950	2,600
Towns without Long Distance	241	44	140	49
<i>Restoration Forces</i>				
Total Participating	7,900	12,000	11,400	11,500
Borrowed People	2,400	950	1,658	1,947
Borrowed Vehicles	620	350	900	1,100
<i>Estimated Restoration Costs</i>				
Expense (Millions)	\$3.7	\$3.0	\$4.5	\$4.1
Capital	5.8	1.2	1.7	1.4
Total	\$9.5	\$4.2	\$6.2	\$5.5
<i>Restoration Interval—Days</i>	28	12	6	5



*Destruction of homes and of tele-
phone facilities was heartbreaking.*





The hurricanes vented their fury in cities, in rural communities, and perhaps most violently in coastal areas.





Control centers in New York and Boston kept score, reported the extent of damage, and sent out the calls for help to sister companies.





Men about to take off for New England are briefed on the challenge and the problems they will meet there.

They load personal belongings aboard fully equipped trucks for the long trek to the scene of need.

Trucks form into convoys, complete with supervisors and automotive specialists, to highball over the highways to east and north.



From Michigan a 90-car train of trucks and eight cars of men head eastward.



A spirit of helpful comradery prevades the groups which go to aid of fellow telephone workers.



*Night and day they roll, stopping only for supplies for men and machines
and for the tolls which permit them to move on the quickest routes.*





Left: Telephone men face many a discouraging situation with skill and determination. Full realization of the grave importance of safe operation rides on every truck and with every crew.



Right and below: Labor-aiding equipment played its constructive part in the speedy and efficient replacement of needed items





Often-times there is no substitute for knowledge, skill, and physical strength.





Since falling trees and tree limbs cause the greatest amount of damage, most of the restoration calls for aerial operations.



Work goes on while daylight lasts.



An emergency generator supplies power to a hard-hit Long Lines operating building.

A "telebus" which was moved from place to place makes service available to people whose own service cannot be used.





Supplies were never lacking to implement the manpower which is everywhere at hand to do promptly what needs to be done.



Coöperation is the key to the successful overcoming of one more critical situation which the Bell System faced—and licked.

SELLING OUR CUSTOMERS EVERYTHING THEY NEED

EUGENE J. McNEELY

Vice President, OPERATION AND ENGINEERING, A. T. & T. CO.

BELL SYSTEM TELEPHONES have doubled in the last ten years.

Long distance messages have more than doubled.

We have had tremendous expansion—but our customers' needs and demands have been even greater.

While we did our best to meet their wishes, we were forced in many instances to ask them to get along with far less than their real needs.

By the end of 1954 we shall be catching up with the expressed demand in most parts of the country.

We shall generally have sufficient central office facilities to care for new customers without delay.

The station gain will have dropped from a going rate of over two million a year to about a million and a half.

In 1955 the Western Electric Company will be able to furnish three and a half million telephone sets, hundreds of thousands in color, and more cable than ever before.

All those facts show that we are now generally in a position to look for opportunities to provide more complete and convenient service to our customers.

It goes without saying that adequate plant to care for all needs does not appear every place at once. While in the over-all we now have adequate central office facilities, there are some offices that are now nearing complete fill. And while our average cable fill is 75 per cent, there are many cables at present containing no spare pairs.

Before starting a merchandising program after a long period of plant shortages it is necessary, therefore, to determine the adequacy of facilities available in a particular office or locality when more lines or higher grades of service are to be sold. It is also good business judgment to utilize spare plant to provide more complete customer service.

We have more than 400 types of service and kinds of equipment available for subscriber use. However, in a business such as ours the success of a merchandising program is not in trying to sell pieces of equipment, but rather in knowing just what the customer needs and then selling it to him.

Our opportunities for observing the subscriber's needs and selling him what he should have are indeed great. Business office people, either by phone or in person, have about 100,000,000 contacts with our



Telephones and equipment on display.

customers each year. This represents on the average three to four contacts per customer per year. Plant installers and repairmen on the average visit our customers once every year and a half. Sales and servicing representatives visit our large customers many times each year, and our directory salesmen visit them once a year.

While there are many fields into which our merchandising efforts could be directed, there are several that undoubtedly will prove of the greatest value to the customer, and at the same time are indicated by good business judgment. The following are some of the major fields which are ripe for the sales efforts of all of us:

Long distance service. It is one of the best bargains that money can buy. We now have ample facilities to handle more traffic in nearly all parts of the country.

Residence extensions. In most places they cost less than a nickel a day. Where else can so much convenience be obtained for so little? They can also be installed in two-tone or full color to match the decorations of the room. At present only one

residence out of eight in the United States has an extension, and on connect orders only one out of eighteen has an extension installed at the time the main telephone is connected. There is plenty of opportunity to sell in this field.

Higher grade of service. With telephone rates as low as they are, most families can afford to have individual lines. During the war and post-war expansion, the per cent individual residence lines dropped to 23 per cent of the total. They have come steadily upward until at the end of 1952 they were 29 per cent of the total, at the end of 1953, 32 per cent, and at the end of 1954 will be over 36 per cent—about equal to the previous high level reached in 1940. As we show the customers the advantages and reasonable price of individual lines, it would seem likely that this per cent could go far beyond the previous high level.

Saving disconnects. Experience indicates that disconnects saved have on the average as long a life as new connects. Where there are spare facilities, this activity is particularly attractive as it not only increases revenues but saves substantial expense.

More families with service. It is expected that in the years immediately ahead, the

number of households in Bell territory will increase about 650,000 per year. This offers a tremendous new market for telephone service. In addition, approximately 10 million of the existing households in the Bell territory have no telephones—about 27 per cent. The Michigan Bell Telephone Company recently canvassed all non-users in a well developed community of about 6,000 households, and when the canvass was completed only 240 households, or 4 per cent, were without telephone service. Unquestionably, there is great opportunity to increase telephone service.

More lines per family. In a great many homes, more than one telephone line is needed. While the percentage of car-owning families having two or more cars is 12 per cent the number having two telephone lines is very small indeed.

Private line and right-of-way services. Many businesses find need for special types of communication services, and in this field we are making real progress in developing private line and right-of-way services.

Miscellaneous services. There are, of course, many auxiliary equipment items that will make the customer's telephone

service more complete and satisfactory. Just a few of these are:—pick-up and hold keys, cut-off keys, loud ringing and extension bells, automatic answering devices, shoulder rests, and there are many, many others.

In addition to these various activities, which are particularly timely now, we have of course been active in the broad field of selling to our business customers switchboards, trunks, stations and other auxiliary equipment. These customers likewise are interested in improved representation in the "yellow pages" of the classified directories through effective copy and display space. This field of selling has been growing at a rapid pace during the last five or six years.

Now that our period of shortages is nearing an end, we have before us a great opportunity to sell to our customers the type and quantity of telephone service that they really need, and at the same time more fully utilize telephone plant and make a real contribution to our revenues.

Extensive moving, relocating, rebuilding of lines to meet road-builders' changes without interrupting service imposes burdens on telephone companies

GHWAY CONSTRUCTION AND ELEPHONE RECONSTRUCTION

CHARLES G. SINCLAIR JR.

Outside Plant Engineer, A. T. & T. CO.

EACH YEAR millions of Americans driving to and from vacation lands or between cities on ordinary business or social trips find new and inviting highways beckoning. Many are wide four-lane arteries which rapidly are making obsolete the narrow two-lane thoroughfares built before the days of high-speed transportation.

Despite a stepped-up highway construction program throughout the nation in recent years, the job apparently has just begun. At a conference of the State Governors at Bolton Landing, New York, this summer, Vice President Nixon delivered a message from President Eisenhower recommending a greatly increased highway construction program. The message included this statement:

"To start to meet this problem at this session of the Congress, we have increased by approximately 500 million dollars the Federal monies available to the States for road development. This seems like a very substantial sum. But the experts say that five billion dollars a year for ten years, in addition to all current, normal expenditures, will pay off in economic growth; and when we have spent 50 billion dollars

in the next ten years, we shall only have made a good start on the highways the country will need for a population of 200 million people. A 50 billion dollar highway program in ten years is a goal toward which we can—and we should—look."

Mr. Nixon's reference to the increase in Federal money made available to the States was directed toward the provisions of the Federal-aid Highway Act of 1954 passed by Congress. It authorizes a total of \$1,932,000,000 for the two fiscal years 1956 and 1957—the largest two-year sum ever provided for Federal Highway programs. The President's proposal, of course, would involve a tremendous additional boost in highway building activity.

Regardless of whether a program of such magnitude is undertaken, it is clear that the already overcrowded highways cannot accommodate the millions of cars that continue to roll off assembly lines. The number of motor vehicles increased from 35 million in 1941 to 56 million in 1953. The prediction for 1960 is 65 million. So it is reasonable to assume that more and more highway construction will be needed.



Construction of an elevated expressway across Boston required the relocation of more than a mile of heavy conduit carrying many large telephone cables (below) and the installation of submarine cables (above) to replace those which had to be abandoned for the same reason.



The telephone industry and other utilities, both privately and publicly owned, have a very vital interest in highway construction programs—aside from sharing with individual citizens the desire to have an adequate road system. Highway changes have resulted in substantial expense to utilities in recent years for relocation of facilities, and it is obvious that such costs are being increased substantially. Before the age of super-highways, improvement of roads involved disturbances of facilities which were in many instances minor in comparison to the relocations now encountered and those certain to be required in the future. Modern express highways, with multi-lane and divided pavements, landscaped shoulders, clover-leaf construction, and graded separations at intersections, widen the areas where utility facilities are likely to be located, thereby forcing their relocation. Actually, the effect of such relocation costs is of direct concern to utility users because the utilities have only one principal source of revenue to meet expenses—the customers who use the services.

LOCATION OF utility plant along highways or near them results from legislative enactments and municipal ordinances over the years encouraging utilities to make use of public highways in order to bring economical service to the greatest number of people. Any other policy, requiring acquisition of private rights of way for utility facilities, would have increased the cost of service to the users. Highways are the arteries of modern civilization—they do not serve exclusively to accommodate vehicular travel but also serve as a means of providing other services which promote the public welfare. In many areas it would be impossible to provide essential services to

the public without using public thoroughfares.

(Railroads are the only utility to be reimbursed from Federal funds for costs resulting from highway changes for the relocation of railroad facilities involved in Federal-aid grade-crossing projects. This relief is given despite state statutes which require railroads to pay at least part of the cost of removing hazards at grade crossings. Historically, this Federal assistance began during the 1930's, when many Public Works programs included projects to eliminate grade-crossing hazards.)

During the sessions of the 83rd Congress just concluded, more than a score of witnesses, representing practically every type of publicly and privately owned utility as well as the National Association of Railroad and Utilities Commissioners (which regulates all utilities at the State level), presented before the House and Senate Committees testimony bearing on the problem. Illustrations were cited to show that the effect of relocation expense on individual companies was exceedingly burdensome in many instances and that such costs properly should be considered as part of the highway construction expense. Evidence introduced was based on a study of relocation costs in twelve representative states. In the Highway Act just passed, Congress directed the Secretary of Commerce to make a more complete study, covering all forty-eight states. The Secretary, in turn, directed the Bureau of Public Roads to make this study, and all of the utilities are coöperating.

AN EXAMPLE of a relocation expense encountered by a telephone company is a recent case in Boston. An elevated expressway was constructed across the city to relieve traffic congestion in the center of

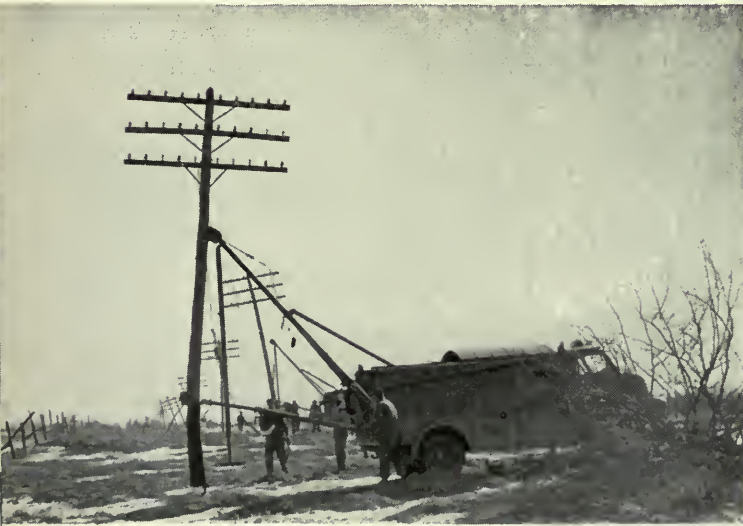
Boston. This involved the relocation of a mile and a quarter of heavy conduit carrying many large telephone cables. It was also necessary to relocate a submarine crossing of the Charles River, which required the installation of new submarine cables at another location to replace those which had to be abandoned because of the highway construction. The outlay occasioned by this project represented an expense to the telephone company of almost one million dollars.

Another job, in Richmond, Va., involved the widening and regrading of a section of the Petersburg Pike, approximately three miles long. All work was within the city and there was no reimbursement of the telephone company. The costs involved

amounted to over a quarter of a million dollars.

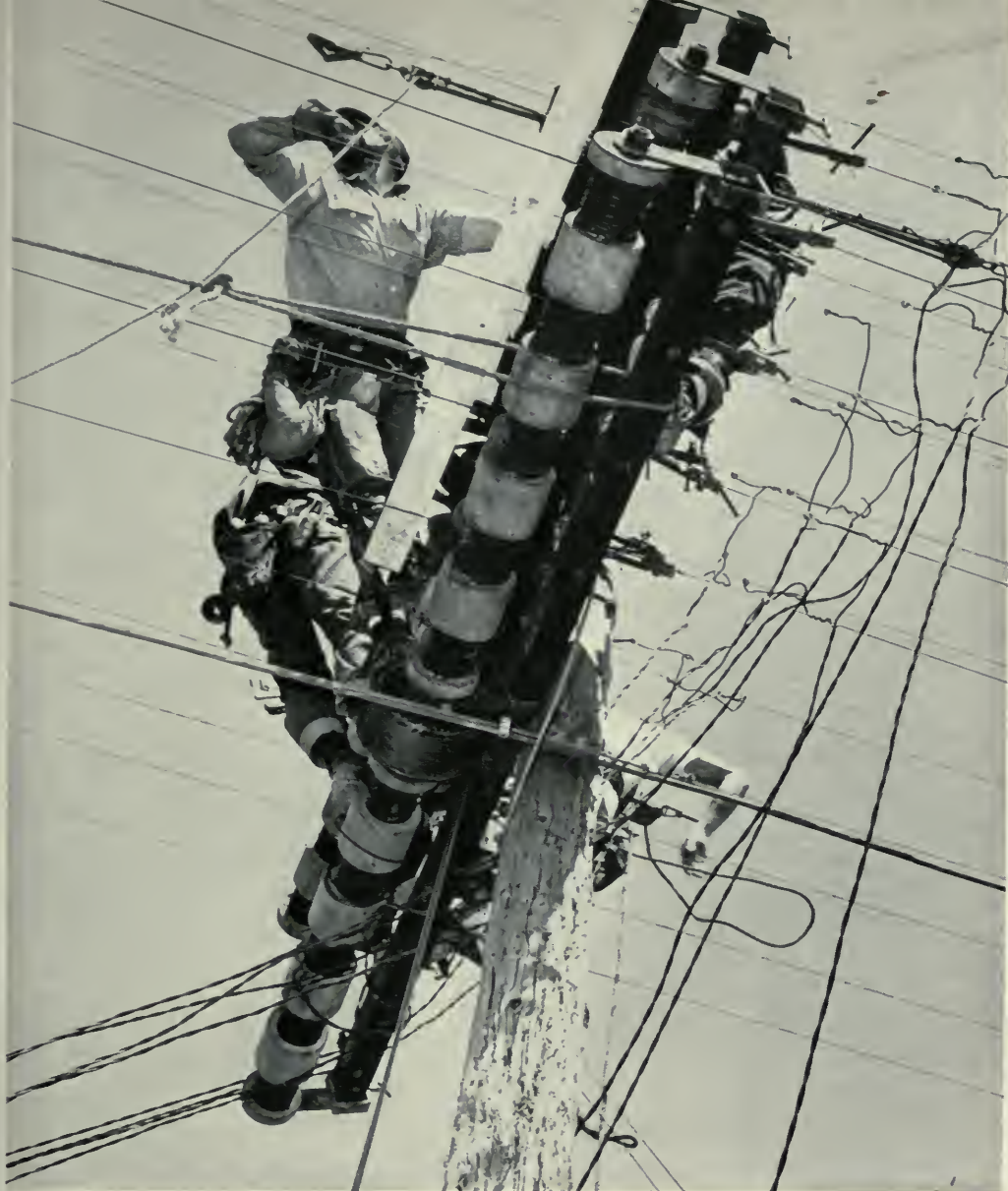
Practically every utility can cite similar cases, and in every instance the relocation of facilities must be carried on in conjunction with the highway construction program, but the utility services must be furnished without interruption if at all possible. This frequently calls for considerable ingenuity on the part of the utility engineers, as the problems encountered are many and varied.

One case involved lowering by several feet the grade of a highway in which the local telephone company had a heavy conduit run containing a large number of working cables. The five-hundred-foot sections between adjacent manholes



Sometimes telephone pole lines can be moved a few feet by standard telephone company construction equipment.





Reels of wire inserted at one end of each line wire to be shifted provide additional length of wire which permits longer moves.

weighed sixty tons apiece, and it was necessary to lower each such section gradually, as a unit. The problem was solved by excavating alongside the conduit to a depth below its base and then excavating under the conduit at intervals, placing large cakes of ice to support the structure. The earth between ice cakes was then removed and the conduit structure allowed to settle as the ice melted under it. By re-

peating this procedure several times, the conduit was lowered to the desired grade.

Frequently a pole line must be shifted further to one side of a highway that is to be widened. The method used to accomplish the relocation of the poles depends upon a number of factors. If the poles are not too large, the normal telephone construction trucks equipped with special gear, known as a pole moving frame, can

handle the job. This gear raises the pole out of the ground and, while still supporting it and the wires carried on it, the truck moves forward or backward to the new location, where a truck-mounted earth auger has dug a hole to receive it. By moving adjacent poles successively in this manner, the desired shift of the line is effected. Of course, the distance the individual pole can be shifted at one time is limited by the pull of the line wires, but ordinarily a shift of eight to ten feet is feasible. Where the line must be moved a greater distance than this, the operation is usually done in stages until the required relocation is obtained. In using this method, the line wires are not cut, so that the only precaution

that must be observed to prevent interference with the continuity of service is to avoid contacts between swinging wires.

An ingenious variant of this method recently enabled a pole line to be shifted a considerable distance from its original location in a one-stage operation. This was accomplished by inserting a reel of wire in each line wire at one end of the section to be shifted. As the poles were moved, the reels of wire were unwound slowly, thus providing the additional length of wire required for the new location of the line.

When the poles are too large, or carry too heavy a load of wires or cables, to be handled by the gear on the normal con-



Powerful cranes are sometimes called on to move pole lines with many cross-arms or heavy cables.



Widening this causeway from two lanes to four made it necessary to move and re-bury in the center parkway the telephone cables which had lain under the fill at the right.

struction trucks, heavy drag-line cranes with booms up to seventy-five feet long are used. These mobile cranes, mounted on caterpillar tracks, are capable of handling heavy open wire lines, cables or even fixtures supporting loading coil cases weighing tons.

A somewhat less spectacular but far more expensive operation is involved when underground utility structures must be re-routed. In such cases there is usually no alternative to abandoning the existing conduit and cable and building anew at another location. An example of this occurred recently when the two-lane high-

way over the eight-mile causeway carrying traffic from the east and northeast across Mobile Bay into the city of Mobile, Ala., was reconstructed to provide four lanes. Two long distance telephone cables had previously been buried in the fill of the causeway at some distance from the original two-lane pavement. The two additional lanes were provided by constructing a pavement over the location of the cables which were thus made inaccessible. The solution required their replacement with new cables installed in a trench in the center space between the two pavements.

One might cite instance after instance of the application of interesting and ingenious methods of relocating utility structures required by highway construction—for literally hundreds of them arise each year. As already pointed out, it seems altogether likely that the number will increase sharply in the future as the nation comes to grips with the problem of providing an adequate and integrated highway system. The financial implications as they affect the utilities—and the customers of the utilities—are serious.

THE STUDY OF relocation costs now under way in all forty-eight states is to be completed in time for the Secretary of Com-

merce to collate facts and prepare a report for Congress by February 1, 1955. Reimbursement for relocation expenses incurred by utilities would eliminate a source of "double taxation" upon the utility rate payers. As it is, they now participate in the expense of building the road by paying their fair share of taxes for highway construction and, under the present arrangement, make a second payment in the rates which must include the utility companies' relocation costs. As utility users, their service is not improved as a result of the highway changes and they receive no special benefit not available to all other members of the traveling public using the highways.

As is often the case where two wire-using utilities operate within the same territory, each of the Bell companies has reciprocal agreements with the Western Union Telegraph Company under which one company may lease circuits from the other. These agreements are based on the premise that, in given situations, economies result from the joint use of plant, and, where this is so, it is in the public interest to arrange for such sharing.

The earliest formal contracts of this nature with the telegraph company were entered into in 1928, two separate contracts being established: one for the leasing of facilities wholly within the same city, the second covering the leasing of circuits between cities. The contracts were completely revised in 1946, in particular the scope of Contract No. 2 being con-

siderably broadened as respects the types of circuits leased. This led to a marked increase in the lease of intercity circuits by Western Union from the telephone companies. As of the end of 1953, Western Union derived over two million miles of telegraph channels from the circuits leased from the telephone companies—constituting over sixty per cent of Western Union's miles of domestic telegraph channels.

For the first time since 1946, the No. 2 contracts have now been amended, effective generally May 1, 1954. The recent amendment makes the leasing arrangements somewhat more attractive than formerly, both as to level of charges applicable and by facilitating the lease of intercity circuits for telegraph purposes at the shorter hauls.

Installations in about 100 model homes throughout the country display the variety and utility of our equipment and services to prospective home owners

TELEPHONE CONVENIENCES IN YOUR NEW HOME

R. S. CALLVERT

Information Supervisor, PUBLIC RELATIONS

DEPARTMENT, A. T. & T. CO.

NO ONE has calculated how many week-end drivers follow those familiar signs along American roadsides that point the way to that commonplace of our civilization, the model home. For whatever it is worth, a big round statistic turned up in late summer when about 1,000,000 people

—more or less—visited a group of “well-telephoned” model homes sponsored by *Better Homes and Gardens* magazine.

There were about 100 of these homes, in 37 states. Each was advertised as “The Home for All America,” and each had been constructed by a local builder after a basic



This telephone was installed in living room of model home, but arrangement of house also required extension telephones.



Yellow telephone, one of new line of eight different colors and four two-tone combinations, blended attractively with decoration in master bedroom of model home.

plan conceived by *Better Homes and Gardens* and R. A. Little and Associates, Cleveland architects. The Bell System's connection with this project amounted to what publicity men are wont to call a "tie-in": a promotional activity in which two or more parties share benefits. The magazine wanted to show the public new trends in home construction and decoration; telephone people wanted to show the public the many telephone services available to the householder. So what was more natural than for magazine and telephone companies to get together and present their wares in the same show-cases?

The plan of "The Home for All America" is that of a low-roofed, ranch-type house with living room, dining area, kitchen and utility room, three bedrooms, two baths, an upstairs guest-activity-TV

room, a downstairs recreation room, and a workshop. Outside are spacious play areas called "patios" in the West; Easterners call them "terraces." Price: about \$30,000.

Here the telephone companies installed equipment representative of our "line" of residential services. Some companies placed descriptive cards or price tags on the various items installed. Most of the companies participating in the project availed themselves of an eight-page full-color booklet entitled "Telephone Conveniences in Your New Home" which had been prepared especially for distribution to people who visited the homes. About 375,000 copies of the brochure, bearing local telephone company imprints, were issued.

Among telephone conveniences advertised in the brochure were extensions,

colored sets, including the new ivory wall set designed particularly for kitchens, outlets for portable telephones in both indoor and outdoor locations, the new light-up dial telephone, the new volume control set for those with impaired hearing, the new automatic answering and recording set. The last-named was included in the brochure because it should appeal to professional men—doctors, for example—or to the busy housewife who, typically these days, has no servant to answer the telephone when she is out.

In each "Home for All America," local department stores had decorated and fur-

nished the rooms. Several telephone companies saw this as a chance to show how our new colored telephones enhance the interior decoration schemes that are currently popular. Full color photographs in the brochure, some of which are reproduced here, also displayed the new line of colored sets. In deciding to advertise colored sets in the model homes, telephone people were convinced they would help sell other telephone items that were immediately available almost everywhere in the country.

Encouraging sales of one of our best bargains, the extension telephone, was a



New ivory wall telephone is proving popular in kitchens. In large kitchen, ideal installation will permit the housewife to sit down while telephoning.



Gaily colored extension telephone fits recreation mood in this downstairs playroom. Model home also has other indoor and outdoor play areas where extensions were needed.

main objective in the "Home for All America" promotion. Curiously enough, although modern architecture stresses "compactness" and "functional" design, the nature of the typical modern house actually brightens the prospects for extension sales. "The Home for All America" is relatively small, yet it tends to spread. It brings the outdoors "in" and the indoors "out." Besides living room and kitchen, the house has several distinctly separate areas of concentrated family activity. Telephone engineers who looked over the plan of the house agreeably conceded that, as in older or traditional types of homes, there was no ideal central place to install a telephone. The new house required—it literally cried out for—extensions.

The advantage of planned telephone facilities, in either remodeled or new homes, was another strong sales point in the "Home for All America" project. The essence of the planned facilities appeal is that the customer's service requirements

may grow as his family grows, as he makes additions to his house. And so the customer should ask his architect or builder to work with the telephone company in providing "built-in" telephone conveniences—like the electrical outlets installed for household appliances. It's an old appeal—but a sound one.

Continued experience may demonstrate that model homes, in general, are ideal show cases in which to sell tailor-made telephone services. Logic says they ought to be. Their prevalence on the American scene is too good an opportunity for sales-minded telephone people to overlook.

Certainly the appearance of our communications line in a home bearing an "Open" sign should help familiarize the public with some of the 400 items we have to offer. Then, as they search the suburbs for their "dream house," maybe the week-end driver and his wife will always include us in their dreams. It all sounds very probable. And profitable.

Delegation, planning, training, bring about improvements in service, personnel, and cost aspects of the organization through which the Traffic Department serves customers

A PROGRAM FOR CENTRAL OFFICE ADMINISTRATION

MARGARET E. FAWCETT

Traffic Induction and Development Engineer, A. T. & T. CO.

"WITH BETTER MANAGEMENT of time, there is more of it available."

That observation is one of the findings of the central office administration program which is now being extended throughout the Bell System. Its fundamental soundness suggests some of the reasons for both the importance and the success of that program—and, incidentally, why its principles are of interest beyond the bounds of the Traffic organization where it was originated.

What is it, then: this program which occupies the attention of so many Traffic people—and fathers such an aphorism as a by-product?

It is, briefly, a means to help chief operators to discharge their central office responsibilities more effectively. In the process, it helps other management people in the central offices to do likewise. And so, inevitably, it helps the customers to get better service.

Generalities? Yes.

But one district traffic superintendent said "Good service results are obtained

more consistently and with greater ease." A chief operator reported that "The work gets done smoothly and pleasantly and as a result we are all getting greater satisfaction out of our jobs." An assistant chief operator declared that "We are accomplishing more work and we are having more fun."

Those are generalities too. But the feelings they express come from the successful application of the central office administration program both in its basic principles and in its details.

Chief Operators Hold the Key

THE PROGRAM STARTS with the chief operator, so let us begin with her too: the C. O. and the two kinds of knowledge she uses and needs to have.

The first is the technical side of it. And since she started as an operator and came up through the ranks, step by step, that knowledge—or skill, if you will—can be taken pretty much for granted. Cords and keys, dialing or key pulsing, split tricks—all the technicalities of the service or-



The chief operator must have opportunity for creative thinking—for planning and co-ordinating all phases of her job.

ganization of which she is the executive officer are within her experience.

She has other responsibilities, too—non-technical ones. But the chances are that the knowledge and skill to handle them are not as great as her technical expertness—and why would they be? How do you absorb the technique of delegating duties and authority to others? Just when do you learn how to organize a job so that it gets done? Where do you acquire the ability to get along well with people—all sorts of people?

Such leadership qualifications are less tangible than the technical skills of the job and probably a good deal harder to absorb in incidental ways. Yet they are highly important. For only through well-rounded knowledge that includes technical and non-technical skills alike will the chief operator be able to show results in the quality of service, the spirit of her people, and the cost aspects of the job she is doing in the central office where she has charge.

Then what if these important non-technical skills are less well developed; if chief operators lack full confidence in their

capabilities in these fields; if they voice a need for help and further development?

Then training must be given in these skills, and sufficient time must be allowed for the chief operators to become expert and confident in them.

Time is the essential element. Chief operators, like other telephone management people, have been selected carefully for their natural qualities and capacities, and the non-technical skills are certainly within the scope of their capabilities—provided they have the time to acquire them.

Administering a Central Office

A CENTRAL OFFICE is a very busy place.

Administrative-wise, a chief operator usually has several assistant chief operators reporting to her, the number depending on the size and complexities of the office. One of the assistants may be the evening chief and another the night chief. Each assistant is concerned with a number of service assistants—who are also known as supervisors in some companies. And each of these, in turn, deals directly with a group of operators at the switchboard.

A Program for Central Office Administration

The roster of central office personnel is rounded out with traffic clerks.

It is through this organization that the chief operator renders service to the customer, and the quality of that service is constantly on her mind. The whole force must be alert and attentive, for every call is important. The message must go through *now*. These are present responsibilities. At the same time, there is a need to build for the future: the appraisal and selection of operators for promotions—the development of each employee to the best she is capable of—helping new operators to adjust to their environment—keeping all employees well informed about the business,—the training of assistants—all these are no less important.

And always there are the unusual occurrences: storm delays, for instance; new methods or practices to be studied and adopted; requests for information or rec-

ords; conferences, planned for or unexpected.

This little excursion into the activities in a central office should leave no doubt that the chief operator is a busy woman indeed. And that returns us to her need for additional training in non-technical knowledge and skills.

All of which brings us back to the first sentence of this article—and the first scheduled step in the System-wide program we are discussing.

Analyses and What They Show

SINCE THE OBJECTIVE is greater effectiveness on the part of the chief operator and her assistants, the logical beginning-place is an analysis of what each does now—and how much time it takes.

The analysis is kept as simple as possible. Each management employee lists her activities and maintains the record over a period of several weeks.



An assistant chief operator and her service assistants discuss a program for improving service.



An assistant chief operator and a service assistant at the organization chart which lists the names of the operators assigned to them.

When the analysis is completed, the chief operator studies it and she then prepares a composite record of her own activities and those of her assistants. And where the latter have made comments about the time-consuming nature or the questionable value of certain activities, the chief operator makes particular note of those.

Then she and her district traffic superintendent review the results of the analyses, to see what they reveal about the functions of the office and how they are being performed. (Sometimes they learn of ones that aren't being performed often enough or well enough.)

Such reviews are an eye-opening procedure. Here are the sort of things they are likely to disclose:

Duties which can be eliminated entirely or transferred out of the central office; and others which can be simplified.



Regular meetings of the management group enable them to program their time and co-ordinate their efforts.

Unrecognized opportunities for chief operators and assistant chiefs to delegate duties to others in the office.

Duplication in certain activities.

Need for additional management assistance, or for more clerical help.

Insufficient attention to certain management duties.

Recognition of situations such as these is one essential forward step toward remedying them.

The Importance of Delegation

THE central office administration program provides a definite view-point regarding the nature of delegation. It recognizes the chief operator's responsibility for over-all results—but she shares it with her assistants. She discusses objectives and programs, problems and possible solutions—and she likewise shares her knowledge with them. She coordinates and integrates

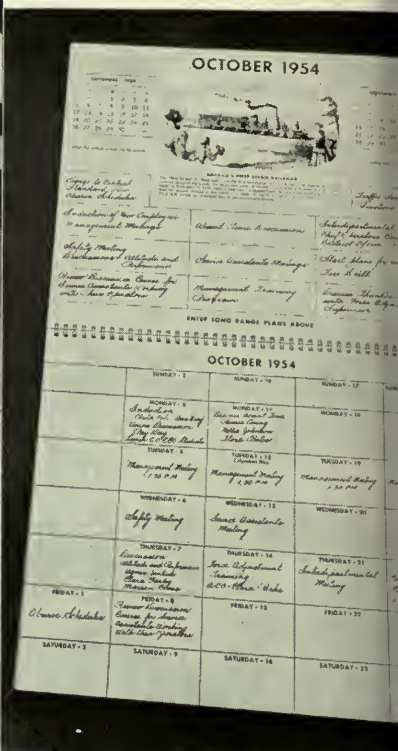
their efforts, and through them she welds the entire employee group into one with a common understanding and purpose—the giving of good telephone service. In the giving, the sharing, the working together, each derives personal satisfaction and pleasure.

It is recognized that a person in the responsible position of chief operator needs to be a good “delegator,” so every effort is made to be sure that the subject is understood clearly and that any fears that cause a reluctance to delegate are uncovered and dispelled.

One chief operator said that she had wanted to give more responsibility and authority to her assistants but feared that she might be considered lazy or that she might not know the answers to all the questions directed to her. “So,” she confessed, “I tried to keep my fingers in everything.” Another chief operator who was



Assistant chief operators receive training from their chief in conducting effective discussions.



A chief operator finds that a "work organizer" in calendar form is a useful tool.

present remarked, "It probably is all right to keep our fingers in most things as long as we don't get our arms in up to the elbows."

Chief operators are urged to assign activities to their assistants, permitting them to share responsibility with them for the attainment of objectives and, as the key-stone, to give to each assistant a well-defined and liberal amount of authority to enable her to act effectively.

When the chief operator delegates well to her assistants, they in turn delegate to service assistants, operators, and clerks full responsibility for their jobs because in a

central office every person has an important part to play.

Each assistant chief operator has a portion of the force assigned to her for whose job satisfaction and work progress she is responsible. An organization chart posted in the operating room shows these assignments. Such groupings permit more frequent discussions by a management person with each employee than was possible when the chief operator tried to do most of this work personally.

These frequent discussions are beneficial in many ways. For example:

Mary is a young and attractive operator

—much too pretty to be labeled a problem. But she could easily have become a dissatisfied employee or a force loss, nonetheless. Mary had a choice of several jobs when she left high school, and selected telephone operating because it sounded interesting. The hours of work were explained to her carefully, but she brushed possible adjustments to working these hours aside until she faced the realities of working them. Then she was not sure that she wanted to be an operator.

However, an alert assistant chief operator spent time with Mary daily, making the work as interesting and challenging as possible, showing her how she could arrange to get a particular evening off, and encouraging her to persist until her seniority qualified her for early evening or day hours. Mary became an excellent employee, with every indication that one of these days she will be able to qualify for a higher level job.

Grace, on the other hand, is an experienced operator, one who does consistently satisfactory work and who is dependable in attendance and punctuality. She makes few requests of any sort, and is the kind for whom any office is truly grateful. But does she want to be appreciated silently? Certainly not. On one occasion she remarked wistfully, "The loneliest girl in the office is the one who goes along doing her best each day. Supervision does not seem to have much to say to her." Grace knows now that she is appreciated, and she is putting even greater effort into her work.

While the operator's chief contribution to good public relations is good telephone service given consistently and courteously, she has many opportunities to answer questions that her friends and acquaintances ask about the company and her job. It is a

recognized management responsibility to provide opportunities for her to obtain desired information easily and promptly, and getting informal channels of communication established encourages such requests.

Ethel, an operator of about a year's service, met a neighbor who had a complaint about the company. He had been waiting for some time to get "regraded" from a party line to an individual line and he was certain that some of his friends had received faster service than he had. He remarked, "I wonder if you really have a good system for taking care of these requests?" Ethel did not know how the situation is handled, but she was certain of one thing and she said so emphatically: "I don't know what method is used but I am sure it is an honest one and our company would want you to feel satisfied. I'm going to find out more about this for you."

Ethel referred the discussion to her assistant chief operator, and was pleased at the prompt explanation she received. It made her feel important. Ethel was assured that the customer would be reached and a satisfactory explanation made to him also—one that would convince him of the company's fair and impartial treatment of customers.

Good delegation not only provides time for discussions with employees; it also is insurance that all parts of the job will receive merited attention.

Planning to Make Time

ALONG WITH clear-cut delegation goes careful planning: planning which enables each management person in the central office to make the most effective use of her time. And the regular daily duties and each day's unexpected happenings add up, between them, to consume the greater part of each

individual's time. It is the time *which is left* which can be planned for—can be devoted to activities perhaps formerly postponed or even not done at all!

To serve as a guide in all this, chief operators prepare long range programs, allowing time for all phases of the job, for a year ahead, and then from them plan their weekly and daily programs. Assistants usually plan in the same way, except that their long range programs cover shorter periods—about three months ahead.

The ability to develop practical work programs and carry through on them is another management skill and it ties in with the very important element of "time" which was mentioned earlier—time to devote to an activity, skill to perform it effectively.

When each assistant chief operator understands what her duties and responsibilities are and the extent of authority she has on each one, she is requested to make a self-analysis of her training needs. This she does by reviewing her list of duties and asking herself the question: "Am I confident of my ability to act effectively on each of these assignments?" She discusses with the chief operator each case where her answer is "No," and from this a plan for training is charted. Similarly, the chief operator reviews her personal training needs and discusses them with her district traffic superintendent.

One chief operator said: "When I heard that part of the program I said to myself, I'll do no such thing. After all, I have been a chief operator for 10 years and I should know all about the work." However, when she started reviewing the list of training needs of her assistants, she realized that in order to prepare herself to fulfill their needs, she, too, required more training.

The assistant C.O.s regard the invitation

to list their training needs as a golden opportunity, and usually ask for more training than any one else would schedule for them. Sometimes they do not know precisely what specific training they need but they state their problems. It is in the field of non-technical skills that they have the most difficulty in expressing their needs.

One assistant chief operator said that she could work with an operator personally and usually get good results but she added: "I can't explain clearly how I do it and therefore I can't train some one else to do it." Of course what this assistant was asking for was a greater knowledge of how to work with people successfully: help in recognizing these skills and assistance in how to teach them to others.

In addition to training requirements expressed by each individual, the person to whom she reports suggests additional ones that seem to be needed. This is done carefully, because regardless of the value of a course, it is effective only when the individual feels a need for it and wants it.

The training needs as expressed or agreed to by each management person are entered on individual record sheets and are coded according to the urgency of fulfilling them.

Where Training Fits In

TRADITIONALLY, much of the training of central office management people has been given informally, on the job. Such training is practical, and yet because of its informality, individuals sometimes have been unaware of its worth and so lack confidence in it. It has been a common experience to have individuals request training that proved to be unnecessary. When this fact became obvious, an individual would explain, "I wasn't sure I was right because I picked up that information myself." An



An assistant chief operator discusses figurine painting with a group of operators enjoying this out-of-hours activity.

Attractive bulletin boards carry posters and notices in a central office.



Millinery classes are another favorite out-of-hours enterprise.



important part of management training is to build each individual's confidence in her knowledge and skills.

Timing of training is important, because if it can not be applied promptly and when needed, much of its effectiveness will be lost. In order to insure the success of off-the-job courses, the training is given by an individual's supervisor to the extent practicable, and followed through by her until the individual can apply her knowledge skillfully.

When persons other than the immediate supervisor conduct training courses, there is a well-coordinated plan of follow-up training conducted on the job. For example, learning how to administer the central office force schedules to provide that the right number of operators are always on duty is frequently given in an off-the-job course by a staff specialist who will have a group of individuals from several central offices. Then when each individual returns to her office she is given the opportunity to practice what she has learned, and the guidance she needs to become fully proficient in force administration is given by her immediate supervisor—in this case the chief operator.

Individuals have been encouraged to fulfill some of their training needs through a program of self-development. The giving of more responsibility and authority has stimulated the idea that it is each person's responsibility to participate actively in determining her training needs. Now, instead of waiting for the training to come to her she goes after it herself.

Just as it is one of the chief operator's major responsibilities to train her assistants, so is it the district traffic superintendent's responsibility to train his chief operators. It carries beyond getting the central office administration program es-

tablished firmly. Good leadership, inspired leadership, needs continuing attention so that it will grow in effectiveness.

Valuable assistance is being given to district traffic superintendents and chief operators by traffic staff people. They are in a position to acquire broader knowledge and greater experience in the application of the program because of their wide range of contacts in the many offices they visit.

Experience meetings conducted by staff people and attended by district traffic superintendents and chief operators have become valuable aids in getting a pooling of good ideas and exchanges of practical experiences. These meetings keep enthusiasm and interest at high levels and result in continuing progress.

The central office administration program is effective both in improving central office operation and in developing each individual to her maximum capacity and at the same time helping her to derive the greatest satisfaction possible out of her work.

Preparing for the Future

BUT THAT is not all it accomplishes. It is helping to meet the challenge of future developments.

As the System moves forward in its program of customer toll dialing, it is going to mean the gradual elimination of the simple calls from one number to another.

This does not mean the elimination of the operator, for there is every indication that she will continue to be a most important element in our business. Her work will grow even more interesting and more challenging than it is today. It will be more important too, because fewer personal contacts with customers will make it essential

that every contact leave impressions of good service and courteous treatment.

This progress calls for an ever-improving leadership in the supervisory group in each central office. It emphasizes the importance of selecting well qualified candidates for promotion, and the need for adequate training in leadership skills.

The central office administration program has become a framework into which present and future central office activities can be fitted in an orderly manner. It is the tool which has been needed to make the chief operator the service executive she really is, enabling her to give adequate attention to all phases of management, so that her office will be as outstanding in the

less tangible personnel aspects of the job as it is in the technical ones.

There is every indication that the problems of the future will be met adequately. Today's chief operators are resolved that tomorrow's chiefs shall be as good as and maybe even better than they are.

This spirit is typified by a chief operator who was being complimented for the efficiency, poise, and initiative displayed by her assistants. Her reply was: "I'll be retiring before many years, and I can think of no more fitting way of showing my devotion to the service and my appreciation for the satisfaction I've derived from my job than to leave well-trained leaders to carry on the traditions of good service."

ONE OF THE BELL SYSTEM's four outdoor test plots for timber products was closed down recently after the completion of 25 years of telephone pole "life tests." The one-acre plot, located at Limon, Colorado, was used by Bell Laboratories timber products engineers to determine the best methods of wood preservation for lodgepole pine and western red cedar, two types of poles economically practical in the Western states.

As a result of the tests at Limon, the best wood preservative was found to be creosote or pentachlorophenol-petroleum. Also tested were greensalt, and several inorganic salts, including various mercury and copper compounds.

Forty-three of the 405 ten-foot pole lengths from Limon have been shipped to Murray Hill where they are now being cut, shredded, and analyzed to determine how much of the wood preservative has been retained in the 25 years. By determining the extent of evaporation at Limon, the serviceable life of the properly treated pole can be accurately predicted.

Training methods and devices developed in Baltimore by school administrator and telephone man gain recognition from secondary school teachers throughout the nation

NEW TELEPHONE PROGRAM AIDS HIGH SCHOOLS

E. DUNCAN HYDE

*Supervisor of Business Education, DEPARTMENT OF EDUCATION,
CITY OF BALTIMORE; and*

CHAUNCEY R. TATUM

*Commercial Supervisor, Public Relations, THE CHESAPEAKE AND
POTOMAC TELEPHONE COMPANY OF BALTIMORE CITY*

MARY MARSHALL WAS EMBARRASSED—chagrined, even. It was her first day in her new job, and she had failed to handle a normal situation properly. It was a tremendous disappointment for a young high school graduate. The cause of her downfall had not been her shorthand or typing, in which she had been so thoroughly drilled in school, but—of all things—a telephone. It had rung in her boss's absence, and she had attempted to answer it—only to discover that what looked so simple, so self-evident, had her stumped.

The experience of Mary Marshall, fortunately, has not been repeated for many graduates of the business departments of the Baltimore City public schools since the members of the class of 1950 received their diplomas. Today, not only the graduates of the public high school business

courses in Baltimore City, but also those of thirteen county systems and girls in a number of local parochial high schools in Maryland, receive realistic training in office use of the telephone with "live" telephones. In addition, other teachers are borrowing the "telephone kit" for use in illustrating applications in their own areas of teaching; e.g., vocational counselors train students in making telephone appointments for job interviews. One county school system has extended use of the material to its core curriculum, where all students may benefit from the training.

In essence, a practical, down-to-earth application of good public relations techniques to typical business telephone conversations in the fields of banking, retailing, insurance, transportation, and secretarial work is demonstrated by fellow stu-



An office practice class in business use of the telephone.

dents to entire classes by means of a portable classroom amplifier unit. The demonstration unit and teaching material were developed over a period of several years by the present writers, with considerable help from teachers in the high schools.

The Baltimore course, as revised in December, 1951, served as the background for a similar unit developed for Cleveland schools in 1953. Now, as a consequence of a flood of requests from business teachers all over the nation, the A.T.&T.Co. is preparing a teaching unit, including teacher's manual, student booklet, case material, telephone amplifier unit, and other audio-visual materials. This unit will be available to all Bell System companies before the end of the 1954-55 school year.

Employers Complained "Graduates Can't Use the Telephone"

THAT THERE HAD BEEN other Mary Marshalls among the graduates of Baltimore City high schools was well known to one

of the writers. He had observed them as teacher and supervisor; but it was in the latter capacity that he was made more fully aware of the situation when the supervisor of guidance and placement reported a summary of business-men's criticisms of most recent graduates.

Responses to follow-up questionnaires, by employers who had hired graduates through the placement bureau of the Baltimore City schools, listed the perennial complaints: inability to spell and punctuate, weakness in arithmetic, and *little or no knowledge of how to use the telephone*.

While improvement in spelling and arithmetic is a problem of teachers of these subjects, beginning in the intermediate grades, and instruction in the language arts encompasses oral communications, teaching the use of the telephone is chiefly the concern of business teachers in the high schools—for it is their students who are being prepared primarily for business life.

Business education may be defined as that phase of education dealing directly with the relationships, attitudes, skills, and knowledges necessary to the student for his understanding and adjustment as he prepares to function in that great economic and social institution, *business*.

To provide training that will enable students to enter initial positions successfully, the courses taught in today's high schools are both practical and factual. Because of the extent of the telephone's use as a communication medium, it is only logical that telephone usage is included in many phases of this instruction. The importance of including information about the telephone has long been recognized by business education textbook writers, most of whom have been classroom teachers. Space devoted to the subject varies from ten to as many as fifty-five pages in

the texts available for Office Practice, Secretarial Practice, General Business, and Consumer Education courses. Information on the telephone and its use is found also in the texts for the Distributive Education courses of advertising, retailing, and salesmanship.

Converting textbook material to training that is practical, meaningful, and realistic to students is a major problem of good teaching. In an attempt to do this, a few teachers had managed to provide some make-shift telephone arrangements. One had acquired an old private push-button intercommunicating system with six stations, much like those used in offices of yesteryear, on which he "listened in" while students carried on typical office conversations. Another had bought two war-surplus sound-powered telephones with his own money, and still another had hooked

Practice in case methods brings confidence to telephone novices.



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up a surplus telephone with a loudspeaker on the end so that the class could share in what was being said. By and large, however, the individual teacher had no real means of putting the telephone story across. Such was the situation when Baltimore's supervisor of business education asked the telephone company for help—on the theory that the company that supplied the service should know best how to do the job.

The assignment of developing a program for the schools was given to a member of the Chesapeake and Potomac Telephone Company's customer relations staff. For many years the company had been giving advice to business telephone users in the form of printed booklets and folders. These were considered, along with several films produced by the Bell System, to be the story of good telephone manners.

Armed with these materials, the company customer relations man first met with a committee of teachers who had already made some progress toward a single course in telephone instruction rather than teaching parts of it in several instructional areas.

Initial Training Materials Prove Inadequate

THE FIRST TEACHING MATERIALS included two non-working telephones for every school, four telephone directories, a teacher's manual, a student booklet, and suggestions for the use of the film "Telephone Courtesy." These were delivered to the schools in January, 1950. Used as near the end of the school year as possible, so that students going to work would have the training fresh in their minds, these aids seemed to offer a tangible means of doing a better teaching job.

Handiwork of a student bulletin board committee.



In the Spring of 1951, when the unit was scheduled for its second year of use, the telephone representative started a round of visits to the high schools, talking with teachers and students individually. It became apparent that there were lacks in the training material. For those who came from homes where there was telephone service and who were familiar with the "feel" and use of the telephone, it was possible to put on a demonstration conversation with the two inoperative telephones. But for the others (from 10% to 60% were dependent on the school for instruction)* it was like learning to start a plastic model outboard motor that couldn't run—or perhaps like learning the process of milking with a wooden cow.

In some schools, students from homes without telephones would not cooperate, and even where students acted well in using the non-working telephones, they acquired the bad habit of talking too loudly. They were raising their voices so that all students in the classroom could hear.

Many youngsters naturally rebel against rules. Only when they can observe or experience the consequences are they willing to accept and apply guiding rules that others have found necessary to life. Many pupils considered telephone training "just more of the same stuff—rules, rules, rules." Others were sure they wouldn't need it in their future jobs.

A careful analysis of the situation disclosed that the basic difficulty lay in the approach which had been used. Quite

logically, all training material in techniques, manners, and courtesy had been designed by telephone companies for existing telephone subscribers: people who had telephones. Authors desiring to include telephone training material in their new texts had gone to local telephone offices for information. The booklets which they received, and subsequently incorporated in one form or another in their texts, were quite naturally prepared for and aimed at people with telephones.

The Program is Improved

TO MEET THE SCHOOL SITUATION a new approach was required, incorporating the following:

1. Live telephones, over which pupils could experience the feel and use of the service in two-way conversations.
2. An attention-getting and class-sharing medium—the loud speaker. This would allow designated students to carry on telephone conversations and simultaneously promote participation by the remainder of the class.
3. Textual material of typical and factual conversations, indicating how the telephone is used to communicate information and ideas in business. The conversations were shown in two forms: indifferently—so that students could observe the inadequacy of the method and pick out the errors; interestedly—demonstrating good techniques and the application of public relations principles to telephone contacts. In addition, the interests of the teachers of office and secretarial practice, distributive education, economics, etc., were kept in mind, so there would be cases for each field of instruction:

retail stores—customer calls, orders, complaints;

merchandising—suggestive selling and selling by telephone;

* December, 1953, statistics show 65% of the families in Baltimore City with telephone service. However, in some neighborhoods 95% of the families may have service, while in another area the percentage may be as low as 40, with larger families in the non-service group. School populations reflect this wide spread as far as previous telephone experience is concerned.

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secretarial and office practice—duties of private secretaries, a proper preparation of memoranda of telephone calls;

consumer education and general business—insurance, banking, travel, shipping, etc., proper and effective use of the telephone directory.

There were many trials and tribulations to designing a portable, combination live telephone circuit and amplifying system, which was suggested to the mind of the telephone man in part by the experiments of a teacher at Baltimore City College and in part by his own personal hobby of high-fidelity music reproduction. The authors owe a debt of gratitude to several employees in the Plant and General Engineering Departments of the local telephone company for their help in developing the portable unit.

With the addition of twenty-two case studies of appropriate telephone calls, the Teacher's Manual grew in size to 172 pages (typed). In addition, copies of all cases were reproduced, without the teacher's informative notes, for the use of students and enclosed in a supplementary envelope.

A test of the new teaching material was made with a small group of new employees of the Chesapeake and Potomac Telephone Company of Baltimore City. On the basis of this experience, typical time schedules for the course were set up for teachers' guidance. A sample follows:

- | | |
|-----------------|---|
| 1st (Hour) Day | —Introduction: Student Booklet, Part I |
| 2nd Day | —Film, "Telephone Courtesy" |
| 3rd Day | —Student Booklet, Parts II and III |
| 4th to 8th Days | —Processing of selected cases (Average 2 cases per teaching hour) |

9th Day

10th Day

—Directory Lesson

—Film, "Thanks for Listening"

How the Improved Program Was Introduced to Teachers

TO INTRODUCE the expanded material to the teachers in the business education courses of the school system, a workshop meeting was held for all business teachers and others interested on January 16, 1952. The course was outlined, set-up and use of the amplifier kit was explained, and several of the cases were demonstrated for the teachers. Telephone business office employees took the parts of participating students, and the teachers evaluated the case material as students, the telephone company representative acting as teacher. This procedure has been followed as additional school systems have adopted the program, except that a tape recording of a class in session has been substituted for the presentations by local business office people.



Equipment: telephone amplifying kit and teaching materials, as developed in Baltimore.

The telephone representative personally delivered the initial supply of materials and the kit to each high school. In most instances, department heads called in their teachers to practice setting up the kit, and to afford them an opportunity to clear up questions which had developed in their minds since the meeting.

*Teacher and Student Evaluations
Confirm Effectiveness*

BEFORE THE END of the semester, visits to classrooms showed clearly that here was a better answer to the problem of teaching good telephone habits in the schools. Most teachers were doing an effective job in their presentations. The enthusiastic participation of students in the case demonstrations and their easy and quick acquisition of the importance of warm and friendly attitudes in building better public relations in their telephone contacts were especially rewarding. They vied with one another to participate, and were quick to note any deviation on the part of the participants from what was intended.

The teachers' evaluations, which were requested, confirmed the classroom observations.

According to Teacher A: "The unit extended over twelve class periods . . . The students enjoyed participating in the presentation of the case studies. The variety of situations gives an insight into the types of telephone calls they may be expected to handle. From their apparent enjoyment in both participating and listening to the cases, I feel this is a definitely stimulating device. In addition, they gained information and benefited from the cases in other ways.

"On the basis of student evaluation, the unit was a success. Ninety-five per cent of

the students expressed the idea that it should be taught to all high school pupils. They stated that they were able to detect their faults and correct them, thereby helping them gain a greater appreciation of 'good telephone manners and telephone personality.'"

Teacher B offered these comments: "A hearty recommendation can be given. For the charges of other Sisters, it would not only teach the proper use of the telephone but also expose the children to good manners in practice, correct phrasing of requests, good social relations, and, in addition, present to them fields of vocational endeavor in which they may wish to engage."

Post-class reaction is considered by some educators as an effective means of evaluating student receptiveness; therefore pupil appraisal of both subject matter and teaching is being given increasing attention. There were some interesting student reactions to the new telephone unit when teachers asked students to turn in comments, unsigned.

Student A submitted the following comment: "I liked the unit because it helped me greatly in my usage of the telephone. I especially liked the conversations held by fellow students over the phone, and then to criticize and discuss them. The time spent on the lessons was just right in my opinion, but I think we could have more conversations. This unit helped me in my usage of speech over the phone, way of answering the phone, and how to take orders."

According to Student B: "It helped me to be more courteous towards people on and off the telephone. It helped me develop a willingness to answer the phone. I became more friendly toward people over the phone. It teaches correct man-

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ners. It assures one confidence in answering and talking over the telephone."

Student C's evaluation emphasized somewhat different points: "I learned a great deal from our real conversation on telephones. I am sure that I learned more this way than I would have learned from a book. The experience was also very interesting. This unit also gave me the opportunity to study the directory. The trip to the telephone office was worth while in many senses."

New Case Material Appears to Meet Business Educators' Requirements

EDUCATORS POINT OUT that all learnings are referred to as primary, associate, or concomitant. The *primary* learning consists of the facts, principles, theories, etc., that are the main core of the lesson. The

associate learning consists of the facts and other more objective materials that are learned because they are related to the primary and are logically brought into the lesson. The *concomitants* consist of the attitudes, ideals, and appreciations that the student acquires because of his classroom experience. Good teaching contemplates taking full advantage of all three learning phases.

In its preliminary report,^{*} a Conference on Basic Business Education, held in the United States Office of Education in 1950, recommended among other things to:

"Validate and revise the content of the instructional and learning units in basic business education . . . by obtain-

^{*} "Basic Business Education for Everyday Living," Monograph 74. South-Western Publishing Co. January 1951.

New kit, known as the Teletrainer, recently developed by Bell Laboratories in coöperation with the Commercial division of A. T. & T. Company's Department of Operation and Engineering.



ing additional data relating to business activities, business mistakes, and business problems of youths and adults . . . ”

The writers believe the intent of the objectives and recommendations of the Conference on Basic Business Education, as well as a full share of associate and concomitant learnings, can be achieved from the case material used in the telephone training unit. In fact, so much of the material in the cases affords the teacher opportunities to develop relationships with every-day living that in many ways the telephone conversation seems only a means of accomplishment; yet at the same time ideals of good public relations and telephone manners are being acquired. For example, among the instructional materials will be found:

- Two cases, one on refrigerator repair and another on auto parts, showing use of the number coding system followed by manufacturers to keep track of replacement parts.
- One dealing with reporting of an automobile accident to an insurance company incorporates the provisions of the State Law with regard to filing accident reports with the State Motor Vehicles Department.
- An inquiry to a railroad regarding a shipment explains the method of changing a bill of lading from “Pre-paid” to “Collect.”
- A lesson covering the use of the telephone directories is built completely on the basis of everyday living. Use of this principle enables teachers to make what could be a dull and uninteresting project one that is full of interest and fascination. Some typical problems for students to solve are:
 1. You wish to hire a new clerk for your office. List at least three telephone numbers you could call to have applicants sent to you.

2. Your cashier has brought you a \$10 bill that looks “phony.” Whom would you call about it and what is the telephone number?
3. You have been studying to be an electrician and wish to obtain a state license. What telephone number would you call to get information concerning the date of the next examination?

Visual Materials are Important Teaching Aids

SECOND ONLY TO MOTIVATION is the need for materials for teaching. At best, textbooks are student guides, and the teacher must ever bear in mind that many students do not learn easily from books. Other sources, such as the daily newspaper, the classroom bulletin board, films, and others, play an important part in the process of teaching. It was for this reason that teachers asked the telephone representative for posters and bulletin board materials. Fortunately, a series of posters designed originally to aid business concerns conducting in-service training programs to improve the telephone manners of their employees was available and seemed equally applicable to the classroom situation. A set of these posters, fourteen in all, is now given to each teacher along with the other telephone unit materials.

There are many methods for their use in the classroom. One teacher puts up a new poster each day as the course progresses; the telephone training session begins with the class reading in unison the messages on the posters in the order in which they were put up. In some school systems, as in nearby Baltimore County, much emphasis is placed on the activities of student bulletin board committees.



The Teletrainer being used for individual coaching.

That the telephone unit would play a part in the emotional adjustment of a student never occurred to the authors. But in one school there was a sixteen-year-old girl, new in the neighborhood, who appeared uncomfortable, unadjusted, and unhappy. Pleasant enough in manner, Sally was sufficiently overweight and unattractive to merit no notice from the boys. She did not excel in any classroom work and participated only grudgingly in class social activities. When the telephone unit came along, she was assigned one of the parts in a case. She had the best telephone voice of any pupil in the class, and by the end of the week Sally was the star of the group on the telephone. Several days later, when the school secretary was ill, the office-practice teacher recommended Sally to the principal as the girl to answer the telephone and take care of the office. This series of events changed not only the attitude of the other students toward the girl but also her attitude toward them and

her classroom work as well. The staff psychologist said, "It was this series of events that brought her out of her emotional shell and caused her to forsake her former defense mechanism of 'negativism'."

*Extension of Program to Rural Schools
Culminates in Nationwide Demand*

SINCE THE TEACHING MATERIALS described were prepared initially at the request of a large city school system, they contained much that related to business activities as they would be found in a metropolitan center. The program had been in use only a very short time in the Spring of 1952 when the superintendent of schools in one of the distant Maryland counties asked to have it for his business department.

With some doubt that it might not have the same appeal to the boys and girls in a predominantly rural area, the telephone representative launched the program at a meeting of both business teachers and school principals from each of the four

high schools in Worcester County. A schedule was established whereby the kit was to be shared among the four schools. With the teachers' reports of success, there was less doubt of its effectiveness when the unit was requested by other school systems serving rural and semi-rural areas.

Rural-area teachers point out that where a case or two on farm problems would offer better motivation for those boys who plan to stay on the farm, many of their graduates go to the larger towns and cities to seek employment. In contrast to the friendly familiarity of small-town business people, they observe that it is good for their pupils to learn more of the formal attitudes to be found in business contacts in big cities.

Of special interest is the fact that several school systems are not limiting the use of the unit to business education groups but are finding it worth while for all students.

In every instance, the program has been established on a school system basis, although, in almost every case, the initial request came from an individual teacher. Establishment on this basis was considered the best assurance that administrators approved its adoption, that the program could be inaugurated with a general workshop meeting, that the assignment of the kit could be made by the school system, and that the accumulation of reports of use could be administered by the school board office. However, each teacher is given his own teaching and visual materials. Films are distributed through the

local telephone manager except in those school systems having an audio-visual library which can handle assignment and distribution.

THE AUTHORS wanted to be sure that their new program was sound and had been sufficiently well tested by teachers and pupils before making a formal report of its effectiveness. However, from the beginning, educators in nearby states have been seeking information about it. It was the subject of discussion at an area teachers' meeting in Virginia in the summer of 1952; served as background for a similar program inaugurated in Cleveland in 1953; was tested in a Pennsylvania school classroom in the Fall of 1952; and was reviewed, with approval, by several faculty members in the business education departments at the Pennsylvania State University and the University of Maryland. It was used with a college class in the latter institution in March, 1954. Most recently, the teaching material has been incorporated in the curriculum of the training school for new bank employees operated by the Baltimore Chapter of the American Institute of Banking.

It seems as apparent to teachers as it is to businessmen, most of whom cannot afford or do not have induction and indoctrination training programs, that the telephone is just as important a production tool in office procedure as the adding machine, typewriter, and duplicator; and thus its use should be taught to those being prepared for the business world.

Many automotive vehicles combine specially designed labor-aiding equipment with their primary function of transporting telephone craftsmen to and from assignments

MAINTAINING AN EFFICIENT AUTOMOTIVE FLEET

FREDERICK K. GLYNN

Automotive Engineer, PLANT SECTION, O. & E. DEPARTMENT, A. T. & T. CO.

A PARADOX OF THE Bell System's automotive fleet is that its thousands of trucks and cars are most profitable when the miles are fewest. To say it another way: practically every mile its motor vehicles travel represents a total loss.

That may sound odd—but it makes sense.

For the System's passenger cars carry the supervisors to their installers, splicers, line-gangs, and other craftsmen on location in the field. Quality to a great extent, and certainly quantity, of helpful supervision is dependent upon supervisors' time spent with the craftsmen and not in miles travelled.

By the same token, the many different trucks serve their craftsmen drivers best when standing at the job.

The System goes to great pains to limit these motor vehicle miles; or, to express it another way, to minimize the loss of craftsmen's time between job locations. In the big cities, with their downtown traffic congestion and high degree of concentration of telephones, installers' supplies lockers are located strategically in office buildings.

Each of these lockers serves more telephone installers and repairmen than would several small trucks. The variety of the supplies in the lockers is practically identical with the supplies carried on a truck. Only the quantity differs.

Other methods of diminishing the vehicle miles include the plan of having supervisors ride with craftsmen when on-the-job training requires longer time periods than regular supervision. Again, the location of garages near the center of working areas requires more garages, but each garage is correspondingly smaller in size. The saving in travel time to the job is, of course, the pay-off in economy.

In 1924, in Model T days of 30 years ago, an installer drove his small truck about 8,300 miles in a year, while today he drives about 7,600 miles. The Model T was good for 40 miles per hour—down hill—while today's small truck could go 70 and take most hills in stride. The hours spent in driving then and now probably range from 375 to 425 in a year. Speed is probably no different, because then as now the Bell



Model T—the installer's truck of three decades and more ago.

System was super-conscious of safety. Today the streets and roads where installers work are so congested with traffic that less than Model T speeds are the fastest safely possible.

The trucks for the installers, repairmen, combination men and other craftsmen who usually work alone are the smallest in the telephone fleet. They are the so-called half-ton trucks. The truck chassis and cabs used are strictly commercial products. In this respect, however, desirable production-line options—heavier springs, larger diameter clutches, heavy-duty tires, etc.—may be specified, to better adapt the chassis to the telephone job and to combine the longest life with lowest operating expense.

Telephone truck bodies are practically all of special design, not only for telephone installation but for each job up through the heaviest line construction. These bodies are in reality mobile storerooms and tool rooms. Every regularly needed material, supply, and tool, in requisite quantity, has its stated place in the body. It was such standardization which enabled the hundreds of men rushed to New England last month—as described elsewhere in this issue—to pitch in at once at tasks they under-

stood, working readily with familiar trucks and tools.

Pictured on page 193 are the small general utility and rural body truck, the somewhat more elaborately compartmented installation truck, and the larger utility truck for general work not requiring a winch and pole derrick.

Plumbers, electricians, and other vocations use fitted truck bodies. The unusual feature of telephone trucks is the provision of labor-aiding machinery driven by the truck engine.

To “sidewalk superintendents,” telephone construction trucks are the most spectacular. The winches, pole derricks, pole-hole borers, and other labor-aiding tools are a source of never-ending interest even to telephone people.

Trucks of Many Sizes

THE CONSTRUCTION TRUCKS range from the two-man-crew trucks through to the large crew trucks. Illustrated on page 194 are three sizes of construction trucks. Some of the trucks have all four wheels driven, so that they can negotiate fields and other roadless terrain where the lines and cables follow the crow's flight. These trucks can go almost anywhere that a self-respecting mule will go. All are equipped with winches and pole derricks of Bell System design, and many with pole-hole diggers which can dig a pole hole almost as quickly as a crew could break the sod with a hand shovel.

The pictures of the light and medium-size construction trucks show the pilot or experimental first working models of a new Bell System design of hydraulic-powered pole derricks and the hydraulic pole-hole digger. These are seemingly “push-button” machines. For whereas it takes a construction crew about 20 minutes to

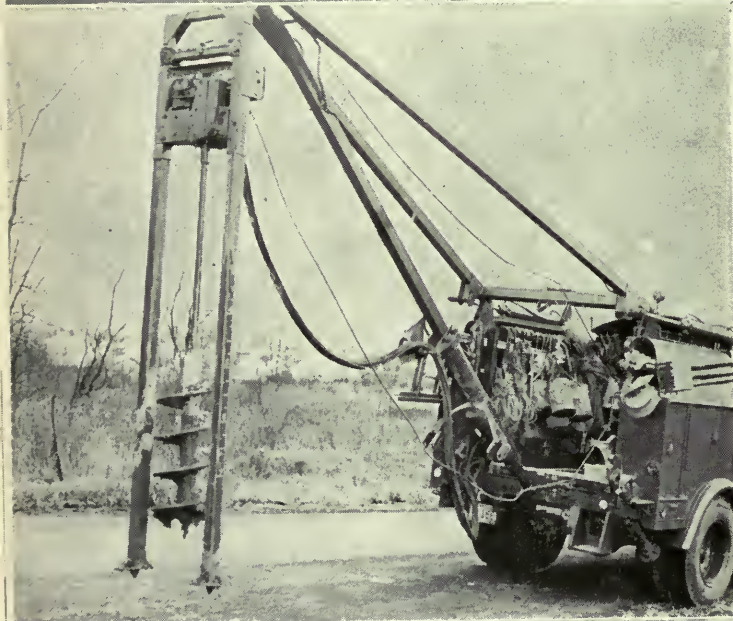


Modern installer's truck with its complement of telephone tools, materials, and supplies.

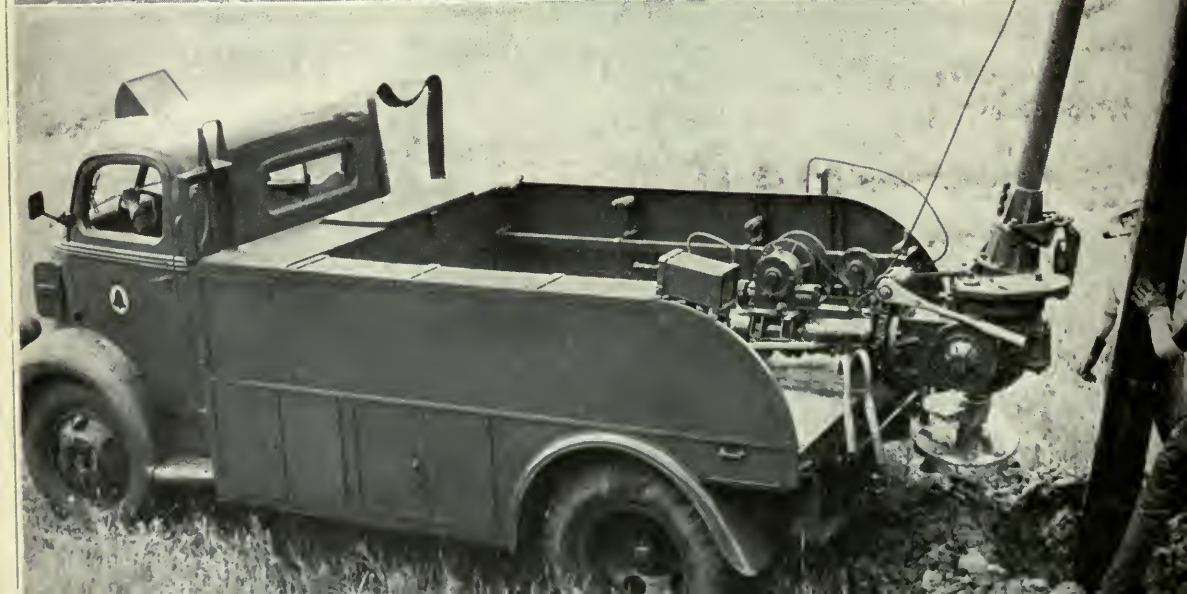
The utility body below offers many options in the arrangement of lockers, bins, and drawers.

The cable line maintenance truck, with ladder platform, permits safe and easy maintenance of aerial cable.





Three methods of handling telephone poles efficiently. Above is a light construction truck equipped with hydraulic pole derrick. Below is a medium size construction truck at work. The derrick folds back over the body when not in use. The truck below enables its crew to bore holes and set a pole in less than 10 minutes.



erect the three-legged pole derrick, and further appreciable time to rig the derrick-suspended digger, the new hydraulic equipment erects itself from its carrying position on top of the truck in about a minute and a half, ready to dig the hole and erect the pole.

To be entirely truthful, it isn't push-buttons: it's short levers which open valves to admit oil under tremendous pressure to the rams of the derrick and motors of the digger. The oil is put under pressure by a pump which is driven from a power take-off on the transmission of the truck engine. Safety of operation is improved, for the hydraulic derrick can be moved up or down at infinitesimal speed by just cracking the valves, and the digger needs no lineman close to it when digging.

When digging gets extensive or rugged, there is a Bell-System-designed earth borer truck to do the job. These trucks mount a big auger driven by the truck engine, and provide limited general construction facilities in the truck body. The borer shaft does double duty as a pole derrick. A winch completes the complement of labor-aiding equipment.

Safety the First Consideration

SAFETY PROTECTION of the telephone craftsman is the first consideration in the design of each telephone truck, its body, and equipment. A general safety observance is to place, insofar as possible, all commonly used tools, supplies, and materials so as to be accessible from the curb side or rear. The road side of a motor vehicle is known as the sui-side.

The comfort protection of telephone craftsmen is cared for by the commercial standard cabs, selected, when options in design are available, to best meet telephone requirements. The forward portion

of the medium and large construction trucks is partitioned into a comfortable crew compartment with windows and curb-side door. There is a waterproof belows between the back of the cab and the front of the crew compartment so that by permanently removing the cab's rear window and providing a corresponding opening in the crew compartment, the travel arrangements approach those of a sedan.

To complete the picture of trucks in telephone work:—materials and supplies are distributed from warehouses and store-rooms to the garages and locker locations in all sizes of delivery trucks from small panel trucks to tractor-trailer vans. Other craftsmen are served with materials on the job by step-in trucks fitted with shelves, bins, drawers, and racks, to hold a standard load to meet the needs of the number of craftsmen served during the day. Others include trucks used in public telephone work, in repeater station maintenance, and in point-to-point radio maintenance. These latter trucks may some day require very interesting design and development work, for "point-to-point" stations are no rescriptors of ease of access. If it's the highest point of land at the proper distance from the next stations, that is where the little house with the high mast is placed. And television as it develops may require appreciable numbers of program pick-up trucks. Time will tell.

Years ago, when linemen manhandled much aerial plant into place, the construction truck chassis had considerable capacity available for carrying reels of cable and other heavy supplies in the body of the truck. Today this free load capacity is limited by the weight of the labor-aiding machinery. It no longer is always practicable to load cable into the truck body, so cable reel trailers have been designed.



Manhandling a telephone pole into place, in years gone by, was neither easy nor efficient.

Poles never could be moved without trailing, but the present-day trailers are a far different design from the one shown in the picture of the gang piking a pole into place.

Other standard trailers, Bell System designed, include combination pole and cable reel trailers, pole and general utility trailers with platform body, emergency mobile radio trailers having a fully enclosed body, and splicers' small trailers compartmented like a splicer's truck body.

These motor vehicles and trailers are so common to telephone operations that even telephone people often forget how indispensable they are. They also fail to realize the amount of design, selection, daily servicing, maintenance, repair, and supervision which produces and makes available safe vehicles for the day-to-day telephone jobs.

The designing of truck bodies, associated equipment, and trailers is done by a group of automotive engineers in the American Telephone and Telegraph Company. It is their work to anticipate the needs of the field forces for new equip-

ment and to continually improve existing designs to meet changing field conditions.

A Coöperative Undertaking

SELECTION is a coöperative undertaking between the automotive industry, the A. T. & T. engineers, and the Operating Companies. The A. T. & T. engineers work out the physical requirements for a truck chassis which will handle a telephone job, scan the specifications of various makes of chassis, confer with the manufacturers' engineers on the strength and ability of component parts, and agree on proper specifications. In the small half-ton class, perhaps six different manufacturers can furnish satisfactory chassis. If so, all six are listed for the final selection and decision in the Operating Companies.

In addition to coöperation in the selection of chassis, the A. T. & T. engineers investigate and evaluate the materials and supplies necessary to the operation and maintenance of the vehicles—such as tires, gasoline, lubricating oil, paint, accessories of all kinds and description, service equipment, and the like. When study of a prod-

uct indicates favorable results can be obtained by its use, it is brought to the attention of the motor vehicle people in the Operating Companies for their consideration. If enough of the Companies adopt the product, purchasing savings are realized through the considerable volume required by the size of the System fleet.

When a truck body, a winch, a derrick, a pole hole borer, or other item has been designed or a chassis adapted or a product selected, it is the further job of the A. T. & T. automotive engineers to write a Bell System Practice providing full information covering safe and efficient operation and use.

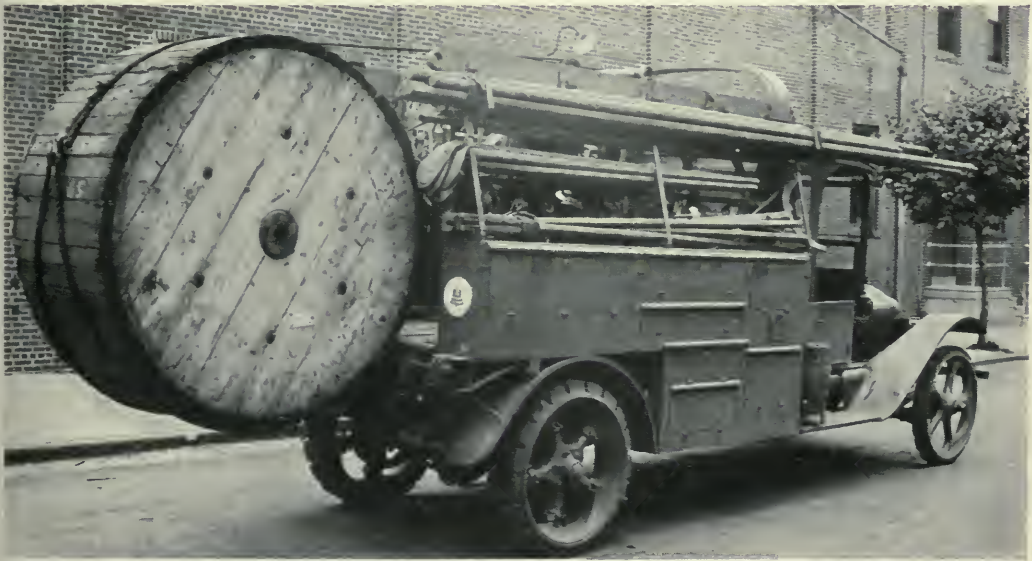
The A. T. & T. automotive engineers have a pride of accomplishment in their work. The Armed Forces have time and again adopted Bell System truck body designs for the use of their signal and communications groups, and many of the design features of the trucks used by other utilities are adapted from System designs. Another fact spurring the A. T. & T. engi-

neers is the absence of pressure in any way on an Operating Company to adopt the automotive practices, designs, developments, adaptations, products, materials or supplies suggested. The A. T. & T. work must be of such value that the operating people in the telephone companies will accept it of their own accord.

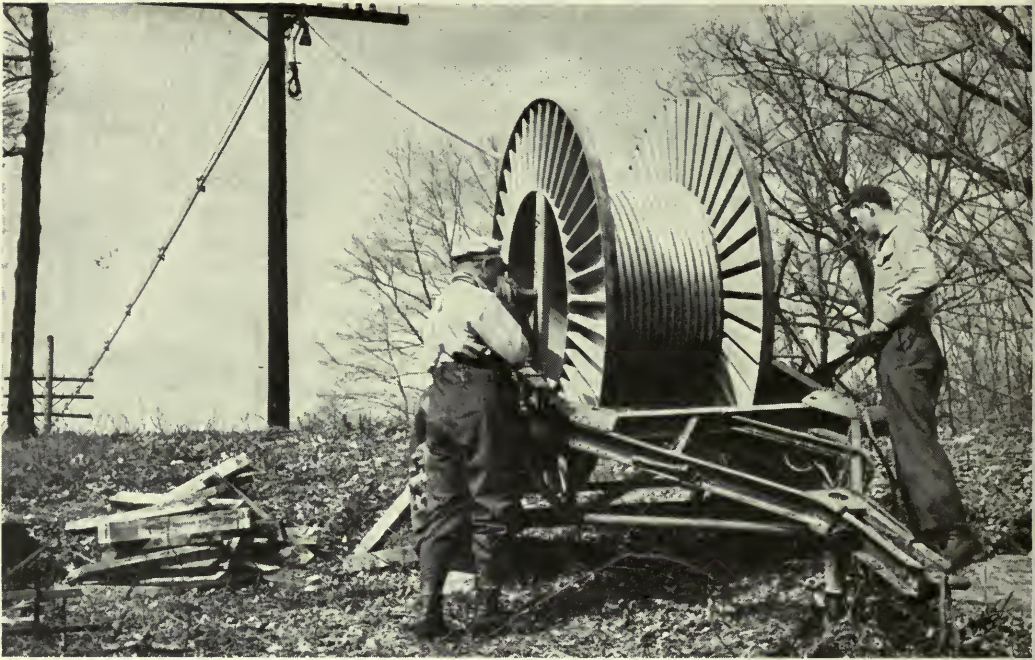
The A. T. & T. automotive work could be summarized as consisting of effort which can be done once at one location instead of being done by each of the telephone companies individually.

At this point the ball is passed to the Operating Companies. Their motor vehicle people are on the firing line. Living with the job, they are more familiar with the local problems. It is their responsibility to secure the new vehicles, the needed materials and supplies, and to maintain the vehicles in safe and efficient operating condition.

The motor vehicle organization in an Operating Company is part of the Plant Department. It is headed by a supervisor



This solid-tired truck of 30 years ago would carry a reel of cable in the body.



Today's trailer carries the reel of cable to the job and then supports it while it is being paid out. With a few rearrangements it will double as a pole trailer.

of motor vehicles, assisted by a staff and in some companies by division supervisors. Reporting to the staff or division people are garage foremen, inspector-repairmen, mechanics, and garagemen. The organization in the companies will differ with the amount of daily servicing and repair work done by the garage forces and the amount purchased from service stations and commercial repair shops.

The supervisors of motor vehicles and their immediate assistants are in a rather unique job. They must have a good working knowledge of all phases of the telephone business. Every department uses motor vehicles. They must also have extensive knowledge of the automotive industry. Their every-day job includes economics, engineering, physics, chemistry, electronics (recently added), accounting, local, state and federal laws and regula-

tions; safety, and a very liberal amount of straight thinking common sense. We think it's the most diversified job in the telephone business.

In all telephone companies, the responsibility for safe mechanical up-keep of the vehicles rests with the Plant Department, but the responsibility for the daily use and for safe and efficient operation rests in the craftsman driver and his craft supervision. The coöperation between the motor vehicle forces and the using groups is very close, as it must be to secure the greatest dividends from the use of the vehicles at the least possible motor vehicle cost.

Safety for the drivers and of the motor vehicle people in these day-to-day operations is stressed. Gasoline tanks and pumps are placed in the garage yards, vehicle lifts are provided, safe tools are available,

and all personnel are trained in the safe way to do the work.

The day-to-day servicing work of the motor vehicle people consists of gassing, oiling, greasing, filling radiators and batteries and tires, washing, cleaning and polishing, touch-up of paint, and making tinkering adjustments (as distinct from repairing).

One feature of the day-to-day job warrants special attention. It is the tinkering adjustments made on the vehicles. Other names for tinkering adjustments are "tune-up" and "preventive maintenance." This work of carburetor adjusting, fan belt tightening, spark plug cleaning, brake adjusting, and a dozen other short tinkering jobs keeps each vehicle safe and satisfactory to drive and importantly defers the day when more substantial repairs are necessary.

In the matter of repairs the craftsman driver has a key part. Except for periodic mechanical and visual inspection by the motor vehicle people, the driver is the only one who knows when the motor, clutch, brakes, battery, and other parts, need attention. To secure this knowledge in an orderly way, each driver is responsible for preparing a "Driver's Daily Trouble Report," more commonly called the "Gripe Sheet" if there is anything wrong with the vehicle. The motor vehicle people act on these reports each night. If the trouble can not be corrected before the week-end, the driver is advised of the situation. If the trouble involves safety in any way, the vehicle is removed from service until cor-

rections can be made. No driver in the Bell System need ever use an unsafe vehicle. As a daily safety precaution, each driver is expected to check his lights, horn, windshield wiper, and brakes as he leaves the garage.

Bell System Esprit-de-Corps

IN ALL OF THE preventive maintenance and repair work on automotive equipment there is an esprit-de-corps throughout the entire Bell System. All troubles encountered which prove to be chronic or repetitive are reported by the telephone company supervisors of motor vehicles to the Automotive Group of the A. T. & T. Co. These reports, if safety is involved, result in immediate notification to all telephone companies. In all cases the A. T. & T. engineers study the trouble with the manufacturer's engineers to evolve a cure. The remedy may be greater frequency in servicing, addition of a strengthening brace, or redesign of a part. Whatever the findings, all telephone companies are advised in the next issue of an A. T. & T. periodic publication called "The Motor Vehicle Service Letter." This procedure welds the Bell System fleet into one big proving ground, resulting in substantial savings in motor vehicle costs and—more important—very definitely decreasing accidents due to mechanical failure of a vehicle.

Five hundred million miles: sixty-five thousand motor vehicles: thousands of trailers: the largest commercial fleet in the world: *it serves best when standing still.*

HEADQUARTERS SUMMARY

June 15 to
Sept. 15, 1954

THE BELL TELEPHONE COMPANIES have again earned the National Safety Council's highest award, the Award of Honor for 1953. This award, which has been received for the third consecutive year, is based upon improvements in both the frequency and severity of accidents during 1953 as compared with the average of the Bell Companies and the communications industry during the previous three years.

IMPROVED METHODS now make it feasible to splice and cut-in terminals on practically all non-working aerial, block, house, and buried distribution cable as a one-man instead of a two-man operation. Introduced over a period of time, the improvements which facilitate one-man operation include: An extension ladder seat, and an arrangement for fastening the ladder to the aerial cable, so as to provide a comfortable and secure working position for the splicer; a small tent which can be handled by one man; an acetylene torch for aerial cable sheath work; and mechanical splice and terminal closures. The most recent—and a major—aid is the Murphy cable tester, which enables one man to quickly identify the cable pairs to be worked.

TESTS of an automatic protection switching system installed on the Denver-Sacramento radio relay system indicate very satisfactory operation. This protection system is arranged to substitute a protection channel for any one of up to five regular broad band channels at times when transmission may be interrupted or impaired by equipment trouble or fading. The system utilizes fast-acting switches at both ends of a section of route 150 to 300 miles long, interconnected by suitable wire or radio circuits for transmission of the necessary control signals to perform the switching operation. The maximum time required for a switch in a typical switching section is about .03 second. The new protection system will be used on all major TD-2 routes, and on such routes will replace the protection system now in use. The system now in general use on radio relay routes provides protection on an automatic switch basis only where a protection channel is assigned to a particular working channel.

A NEW TELEPHONE incorporating a distant-talking microphone and loudspeaker, in addition to the conventional hand set, is in limited

production. The microphone is incorporated in the base of a 500-type set, together with a volume control for the loudspeaker and two buttons for providing the equivalent of switch-hook operation when the set is used for distant talking purposes. The loudspeaker, occupying a space about 3 x 4 inches, is located in a separate plastic housing.

The instrument may be used in the normal manner, if desired, since a regular hand set is included. However, the hand set remains in the cradle when the distant talking feature is in use. It is possible to switch from conventional to distant talking use (or vice versa) during a conversation as privacy or other considerations may dictate. This new telephone is expected to find a wide field of use in business and industrial applications generally, as well as in residences. In addition to freeing the hands during conversation, it permits a group of people to participate in a telephone conversation.

ON AUGUST 18, the A. T. & T. Company directors announced a new nonconvertible issue of \$250,000,000 Thirty Year Debentures due September 15, 1984, to be sold through competitive bidding. Bids were subsequently received from two groups of investment bankers at headquarters on September 21. The winning bid of \$101.9199 for 3¼ per cent debentures was made by a group of 277 investment firms headed by the First Boston Corporation and Halsey, Stuart and Company. This bid represented an interest cost to the Company of approximately 3.15 per cent to maturity of the issue. The losing bid, which was made by the second group of 120 investment bankers headed by Morgan Stanley & Co., was \$101.87, likewise for 3¼ per cent debentures. This issue, which was the largest ever sold through competitive bidding, was offered to the public at \$102.52 to yield 3.12 per cent and met with quick investment demand. So far in 1954, Bell System Companies have sold a total of \$350,000,000 debentures through competitive bidding.

A NEW Employees' Stock Plan offer was voted by A. T. & T. directors on September 15, 1954, with essentially the same provisions as in the previous offering in 1952. About one-half of the 3,000,000 shares authorized for issue under the Plan by share owners in 1950 remain

Headquarters Summary

to be offered now. The purchase price will be \$20 per share less than the market price when payment is completed, but not more than \$150 nor less than \$100 per share. The company plans to send employees a prospectus describing the new offer in October. They will have until December 15 to make their purchase election.

Employees with three months or more of service on October 10 may elect to purchase one share of stock for each full \$500 of their annual basic rate of pay on that date, but not more than a total of 50 shares including any shares purchased or being paid for under the 1952 offer. No A. T. & T. officer will be eligible. If employee elections exceed the total shares available under the Plan the company will allot fewer shares than specified in purchase elections. Purchasers will pay at the rate of \$5 per share per month by payroll allotments beginning in February 1955 and to be completed not later than July 1957.

About 650,000 Bell System employees will be eligible to participate. Installment payments currently being made by some 210,000 employees under the 1952 offer will be completed not later than February next year.

PLANS for an underwater telephone cable linking the United States and Alaska were announced by the Long Lines Department in mid-July, in order to provide expanded and speedier communications for both public and defense purposes. The proposed addition, which will have a capacity of 36 message circuits and cost an estimated \$14,000,000, is expected to be completed late in 1956.

Two deep-sea submarine cables, to be laid several miles apart, one for northbound transmission and the other for southbound, will stretch 800 nautical miles between Port Angeles, Wash., and Ketchikan, Alaska. The new system will be similar in design to the underwater cable to be constructed across the north Atlantic, and will have specially designed built-in repeaters spaced about every forty miles. A sixty-five mile radio relay system will be constructed between Seattle and Port Angeles, while at the other end the cable will connect with facilities of the Alaska Communication System, a branch of the U. S. Army Signal Corps, which now furnishes service to that territory. The Alaska organization plans to build a second segment of submarine cable northward from Ketchikan along the inland waterway to Skagway.

BELL SYSTEM overseas and ship-to-shore telephone service has continued to expand all during 1954. Service between the United States and East Germany has been resumed for the first time since World War II; Goa, the Portuguese colony in India, has been linked; and connection has been established with Singapore and British Malaya. In addition, high seas service has been made available to the Greek liner "Olympia," the Swedish liner "Patricia," the Italian liner "Cristoforo Colombo," and the Atlantic and Caribbean cruise ships "Seven Seas" and "Silver Star."

FOUR BELL SYSTEM ORGANIZATIONS—Long Lines, the Southwestern Bell, the Northwestern Bell and the Illinois Bell Companies—have acquired the private communication facilities of the Great Lakes Pipe Line Company. The first two Bell System organizations are now providing full period telephone and teletypewriter service linking 50 pumping stations and terminals over 1,600 miles of the pipe line company's routes, which extend from Oklahoma as far north as Grand Forks, N. D., and include Minneapolis and Chicago as well. During the summer, the pipe line company also accepted a proposal that Long Lines and Southwestern Bell provide mobile service, to be integrated with their other services.

GAS PRESSURE has long been used in long distance cables, and the resulting improved maintenance made it desirable to extend pressurization to the exchange-cable plant. Since older types of cable terminals are not gas-tight, gas dams, or "plugs," must be constructed in terminal stub cables to maintain gas pressure. The hot-asphalt plugs used on long distance cables are too expensive and time-consuming to be used in the large numbers required by the exchange cable plant. Therefore, Bell Laboratories has developed a new cold-resin plug that is less expensive and is easier and faster to construct.

WESTERN ELECTRIC has announced delivery to the U. S. Signal Corps of a new type of multi-channel military radio relay system which can link points 25 to 30 miles apart by radio and be used in combination to extend hundreds of miles. Similar in principle to the Bell System's microwave relay links, the new equipment is a complete communications system packaged in convenient cases for ready mobility and designed to operate continuously under all types of climatic conditions.

The Blue Pencil



THE UNIMAGINABLE WIND and the abnormally high tide combined to produce waves which wrought havoc along much of the southern New England coast. Vessels of every size were borne far inland and wrecked. Wharves were pounded apart and seaside structures were moved from their foundations or demolished. As the hurricane moved inland its destructive fury vented itself on fine old trees, on houses, barns, and other buildings, on crops and roads and whatever was vulnerable to its unexampled power. But there was no damage to telephone plant.

For there was no telephone. It wouldn't be invented for another sixty years.

It was the hurricane of September 23, 1815, we were referring to: "the great September gale." It was the first storm of such magnitude about which there is much recorded information.

Nearly 200 years before, one had taken a passing wallop at the Pilgrim Fathers—but there was little in the way of man-made structures for it to blow down. In 1788 came another over much the same area. And six years after the 1815 hurricane came a blow which hit New Jersey and Long Island, and crossed over to New England with decreasing force. In New York City it caused more damage in two hours than was ever before experienced.

In the next 117 years there were four more recorded hurricanes, of somewhat erratic behavior and varying degrees of force and damage. That brings us up to 1938 and the famous storm of that year. In loss of life and in damage of every sort it still stands without equal.

A count establishes that, including the four in the last 16 years, there have now been a dozen such ruthless visitations, all told, and leads to the conclusion that a hurricane "track" actually does exist, running up the eastern seaboard, across Long Island and eastern Connecticut and Rhode Island, and into the rest of New England and beyond. The two which came this Fall seem to bear out this notion as they proceeded to take life, to destroy property, to upset people and confuse their way of living.

Words cannot tell much about what a hurricane does, what it is like where a hurricane has passed. We, who followed closely in the path of the 1938 and 1944 hurricanes and wrote about them, have left to pictures and a summary the reporting of "Carol" and "Edna" and the telephone damage they caused and the fine story of restoration.

Calling these storms by names whose alphabetical sequence indicates the numerical order of their origin somewhere East of the Caribbean may be a handy way of keeping track of them, but the names seem trite, and inept with reference to such brute destructive force. "Carol"? "Edna"? Why not "Caesar" and "Eagle"? Those suggest power, at least. And it would not be surprising if the telephone men who had to repair the damage those two coy females did to outside plant had still other names for them.

WHEN EAST CHICAGO TRAFFIC people selected one of their operators as Miss Voice, one of the guests at the ceremony was the East Chicago superintendent of schools. So favorably impressed was he with The Voice with a Smile that he later devoted a column in the school paper to the *Influence of a Smile*. From it we quote:

"The fairly large group of finalists were people—not less nor more beautiful than people generally, not shorter, nor taller; not better nor less fashionably dressed. There was something about them, though, that was noticeably different from people generally—they had radiant countenances . . .

"Those countenances were the reflected evidence of a studied effort to attain a cultivated, expressive, pleasant, and a not necessarily quiet but a quieting and calming voice that radiated good will and a zest to do the best for anyone who heard it.

"The particular quality so highly possessed by these operators, unquestionably, was the product of training that benefited them, but even better was a benefit to the community. What an influence for good in a community is the 'voice with a smile' . . . !

"For pleasant voices and pleasant counte-

Headquarters Summary

nances are contagious . . . Who can do or say mean things, or resist the better impulses all of us have, when greeted by a community of 'voices with smiles?'

AMERICANS are appreciative of good telephone service and all the elements which contribute to it, and we in the industry are accustomed to seeing letters of thanks from customers, sometimes for special services rendered and at others simply voicing general gratitude and good will. Apparently the custom may be carried abroad, along with the national desire for ice water and ham and eggs. The following item appeared in a recent issue of the British *Post Office Magazine*—the British Post Office handling the telephone and telegraph services as well as the mail:

"An American in Britain has given full credit to the transatlantic telephone service. When he recently spoke from London to his sister in Staten Island, New York, he was impressed by the courtesy and efficiency of the operators, by the speed with which he was connected, and because he and his sister could hear one another so clearly. In a letter to the Post Office he comments that 'It is rare, in these days of paying much for little, to receive such value for the expenditure of a relatively small sum.'"

So MUCH that is important and impressive comes out of the Bell Telephone Laboratories that it is interesting—if a mite disillusioning—to find that some of the most spectacular of the equipment there has now been used to shatter one of childhood's cherished fancies. And with all scientific decorum, too. For Prof. Maurice Ewing, director of the Lamont Geophysical Laboratories at Columbia University, brought a conch shell into the free space room of the Labs, where the nearest thing to absolute silence may be established, to find out whether the "ocean wave" sound usually heard when one of these shells is held to the ear is a "reflection" of other noise or does exist within the shell. When the doors closed upon soundlessness, there was no sound to be heard within the shell. The conch is but a sound amplifier! Not many youngsters have access to the noiselessness of the Laboratories' special room, however, and so they will continue to hear with wonder and delight the gentle roar

of the waves in the shell even after it has been brought away from the beach.

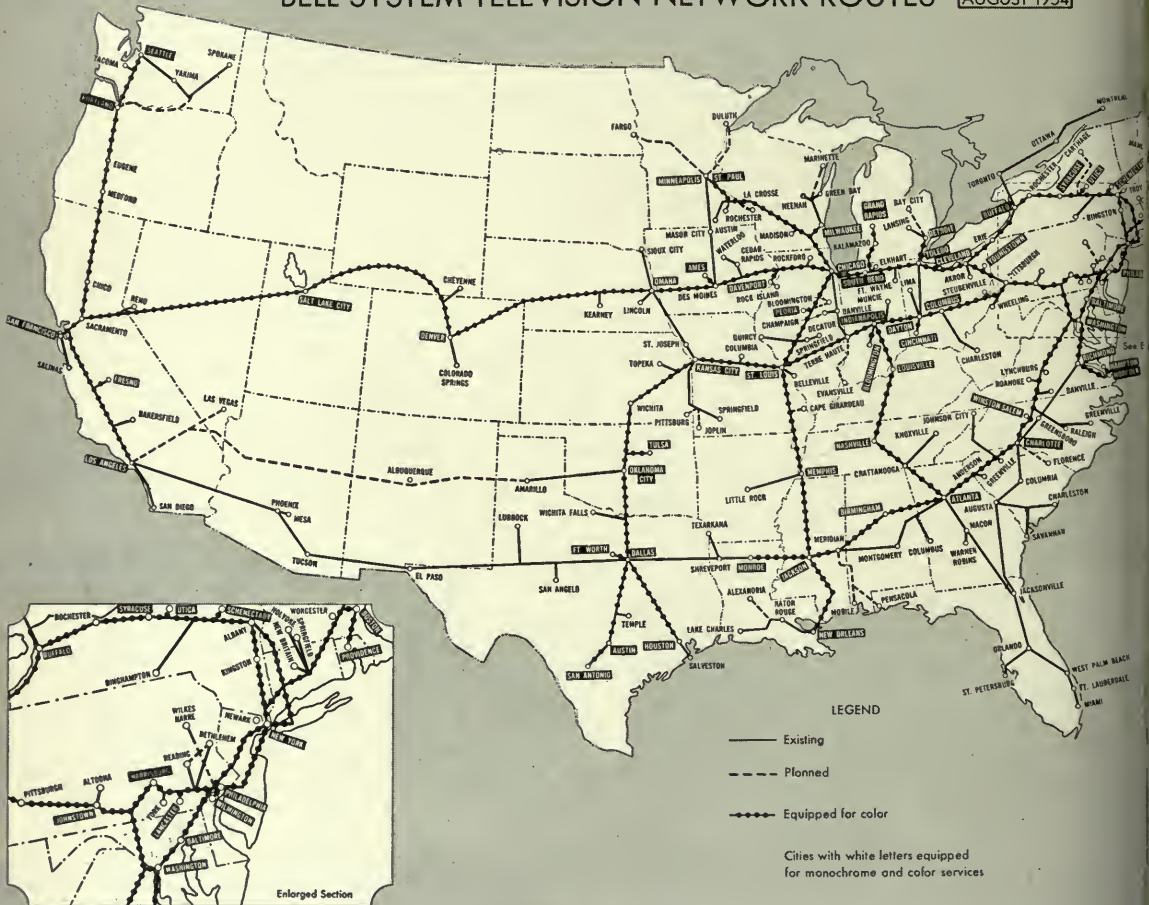
FOR HIS COVER ETCHING, "ACCOUNTING OPERATIONS: People and Diversified Equipment," Carl M. Schultheiss had to cheat a bit. Accounting operations and machines are grouped separately, and in no accounting office would so many types of activity take place in so restricted an area. After visiting several accounting offices, therefore, and making preliminary sketches, Mr. Schultheiss depicted his subjects in the representatives and harmonious composition which graces our Autumn cover.

Mr. Schultheiss was born in Nuremberg, Bavaria, and received his early training in the School for Arts and Crafts there and in the Royal Academy in Munich. He lived for a time in England before coming here, and is now a citizen of the United States. He has worked in various media of the graphic arts: color prints, painting, book illustration and design, as well as with the burin and needle. He is a member of the National Academy of Design, of the Society of American Graphic Artists—president 1948-50—and of other associations in the field. Examples of his work hang in galleries and museums in many countries, and among the awards he has received are—to mention but a few—two first prizes from the Library of Congress, two from the National Academy, and gold medals from the Pennsylvania Academy and the Carnegie Institute.

As was the case with the etchings by Mr. Gorsline and Mr. Castellon, a reproduction of Mr. Schultheiss' "Accounting Operations" will be sent without charge to anyone who writes to ask the editor for it.

WE SEEM to have backed into the art business a bit—quite unintentionally. When we received a request—in addition to those for etchings—for copies of the colorful paintings of Alexander Graham Bell and Theodore N. Vail which were published in our last (Summer) issue, we scurried around and found some which had not been printed on the back, and could be framed just as they appeared in this MAGAZINE. Our correspondent thought they would look nice in business offices. So, "while they last" we shall be glad to send copies of those too on request.

BELL SYSTEM TELEVISION NETWORK ROUTES AUGUST 1954



Work continues on transforming the Bell System television network so that these facilities will transmit color as well as black and white programs. By the end of September more than 100 television stations in some 75 cities could receive color programs over the Bell System network.

B-7

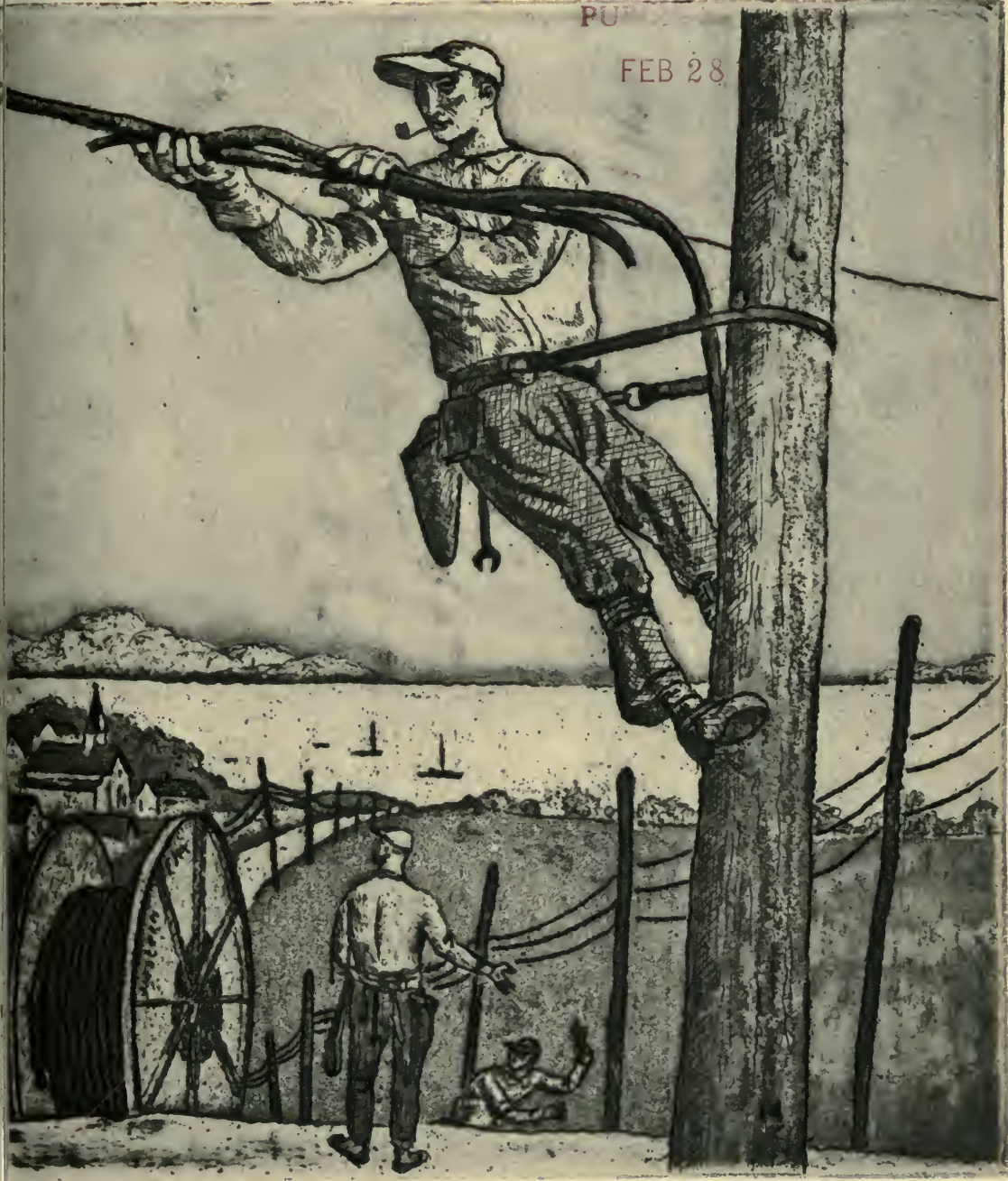
Bell Telephone MAGAZINE

WINTER 1954-55

KANSAS CITY, MO.

PUBLISHED

FEB 28



H. H. H. H.

COMMUNICATIONS FOR TOMORROW: Line Crew Placing a New Cable

Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.



A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: "Communications for Tomorrow: Line Crew Placing a New Cable." From an original etching executed for this MAGAZINE

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"What's Your Telephone Number?" 232

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Who's Who & What's What

IN THIS ISSUE



A. T. & T. President Cleo F. Craig

SINCE JULY OF 1951, CLEO F. CRAIG has been President of the American Telephone and Telegraph Company. His Bell System career, beginning in 1913, illustrates how broad may be a man's experience within the corporate confines of one or two companies. For his assignments in the Long Lines Department took him from St. Louis to Kansas City and Atlanta en route to New York, and to such diverse posts as district plant chief, plant accountant, and construction supervisor, among others—with a six-year interval as a special repre-

sentative in the A. T. & T. General Department—before he became general manager of Long Lines in 1933. He was elected Vice President in charge of the Long Lines Department in 1940, and the following year moved to A. T. & T. headquarters. There his vice-presidential responsibilities included, in turn, charge of the departments concerned with Personnel Relations, Operation and Engineering, and Finance and Revenue Requirements.

The foregoing is reprinted from this MAGAZINE for Summer, 1952. At the beginning of 1955, it still seems appropriate as a brief statement of an outstanding telephone career.

FROM THE LONG LINES DEPARTMENT, where he had been district plant engineer in Richmond, Va., JOHN H. MITCHELL came to the toll service group in A. T. &

John H. Mitchell—who knew Carol, Edna, and Hazel





Stanley G. Ericson, relaxed

T.'s O. and E. Department last Autumn—just in time to become involved with the hurricanes which he discusses in this issue. After two years of Army service in the Signal Corps, he joined Long Lines in 1946. Experience as equipment maintenance man, engineer, statistical accountant, traffic assistant, and communications engineer, in Washington and New York, preceded his Richmond assignment in 1953.

TELEPHONE NUMBERS ceased long ago to consist of numbers only—and that was about the time the matter began to get complicated. The necessity for simplifying again is the topic of STANLEY G. ERICSON's contribution to this issue. He joined the Chesapeake and Potomac Telephone Co.

in Washington as a traffic student in 1929, and by 1948 had become general traffic manager. He continued in that office until 1952, when he moved to A. T. & T. Co.'s O. and E. Department as traffic organization and training engineer. Since joining the latter company he has acted as traffic results engineer, and on January 1, 1955, he was appointed traffic facilities engineer.

KNOWN TO HUNDREDS throughout the Bell System, JACK CLARK has served on both coasts since starting in the Commercial Department of the Upstate Area of the New York Telephone Company in 1929. After holding various positions there, he joined the business office section of the O. and E. Department in 1943, and in 1946 crossed the continent to the Northern California Area of The Pacific Telephone and Telegraph Co. There he was successively general commercial supervisor and assistant to the vice president and general manager, and division manager of the Coast Division, before returning to A. T. & T. in 1952 as business office engineer. The major contribution the business office service representatives make to the Bell System's sales program is pointed up in his article.

(Continued on page 272)

Jack Clark between a sales chart and James C. Thackray, who helped with the article





*A talk at the annual meeting of the
Life Insurance Association of America
in New York City on December 8, 1954*

BIG BUSINESS AND THE COMMUNITY

CLEO F. CRAIG

President, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

IT IS A GREAT HONOR to be your guest and to have this—for me—almost unique opportunity to do some of the talking at an insurance gathering.

On certain previous occasions when I have sat down with insurance men, my side of the conversation has consisted largely of just saying yes or no, as the case might be. And as often as not, when the other fellow had paid for the lunch, I was off to the doctor for a physical.

Looking back on those sessions, and forgetting how I might have felt then, I can't tell you how grateful I am now. And I realize that nothing I may say to this audience can be useful to you in anything like the measure in which the thinking and counsel of insurance men have been valuable to me.

However, you in life insurance and we in the telephone business have much in common. And that encourages me to compare notes with you.

For instance, we are alike in being service industries. We are alike in being big.

We are alike in that everything we accomplish depends on how well the hundreds of thousands of men and women in our respective organizations get along in each of their communities. As still another similarity, we both need to look ahead and make the best forecast we can of things to come.

With this last point in mind, one of your members suggested that I say something about how we in the Bell System try to look ahead, and what we think we see.

I am quite willing to do that, but apropos of how to look ahead scientifically, let me remind you of the eminent astronomer who paid a visit to Mt. Palomar Observatory. He peered long and intently through the big telescope. Finally he said, with the air of a man who has discovered one of the secrets of the universe, "It's going to rain."

An assistant who was standing by said, "Is that so, Professor? How can you tell?"

The great astronomer replied, "My feet hurt."

Now just as he tried to take all the important facts into account, so do we in the telephone business. We look to see where people's feet are taking them, how much money they have to buy what they want when they get there, and how many additional folks of all ages will be around next year and the year after that.

In each community we study the extent and direction of growth of dwelling units and shops and other businesses, the prosperity of the industries in the town, all local activities that may have a bearing on communication needs.

We estimate those needs town by town, add them up, check the result against long-term growth trends and the general business outlook. In this way we judge what the over-all demand for telephone service may be.

That's one side of the equation of the future. The other side, as I've already indicated, is the same in our business as in yours: the character and capacity of our people; not merely their technical abilities,

but what they think and what they *want* to accomplish.

I'll say more about that later.

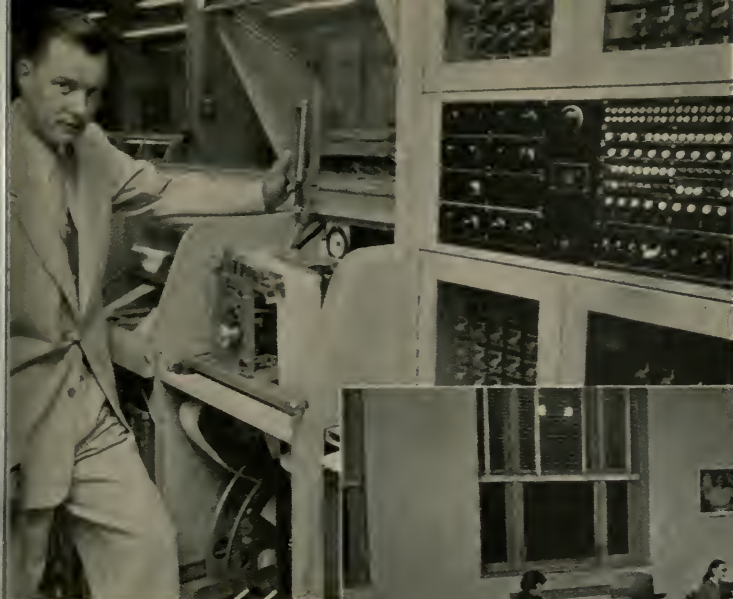
FIRST I'll stick my neck out and do some forecasting as requested. I'll start with the immediate future and go on from there. The only hedge I'm obliged to make is that these comments are based on the assumption of no major change in the international situation.

For the country as a whole, we think industrial activity is going to improve moderately in 1955 and also 1956. How much? Maybe five per cent each year as we now see it, so that at the end of the period the nation will be operating about on the peak levels of 1953.

For the Bell System we are also optimistic. This year we shall gain about 1,900,000 telephones—the same as last year. Next year we expect to have a gain in excess of two million telephones, and I won't be surprised if we exceed two million again in 1956.



“ . . . how many additional folks of all ages will be around next year . . . ? ”



*... the service is going to
keep on getting better ...*

Another important factor is our long distance traffic, which is setting new records. This is now running about ten per cent ahead of a year ago—whereas five or six per cent has been nearer to our normal increase. Perhaps part of the reason is that autumn a year ago showed no gain. In 1955 we expect the total volume of long distance conversations to be five to ten per cent above the present record levels.

Now to look a little further ahead.

When the war ended, the Bell System was serving about 22,000,000 telephones. Today we have 43,000,000. By 1965 we think the number will be at least 55,000,000; probably more.

So we foresee a good, substantial,

healthy growth. We have always grown faster than the country as a whole, and we think that will continue.

I'm also quite sure that the service is going to keep on getting better. People have made it pretty plain that they like to dial their calls. That's the fastest, most convenient, and most accurate way of completing a connection. At the war's end 65 per cent of our 22,000,000 telephones were dial. Today 83 per cent of the 43,000,000 are dial. Five years hence the proportion will be 95 per cent or more.

Along with this there's going to be a great increase in long distance dialing. You may not realize it, but right now the operators are dialing half of all long distance

calls straight through to the distant telephone.

When you place a call with the New York operator for a San Francisco number, she dials that number direct from her switchboard here in New York and the called telephone in San Francisco rings automatically in a matter of seconds.

Telephone users themselves are dialing directly about a quarter of the calls that go outside their local area. Most of them are over relatively short distances; but there are now about 25 places—or will be by the end of the month—where people dial many of their longer cross-country calls as well.

By 1965 we expect that you folks in the room will be dialing a majority of your long distance calls, cross-county and cross-country. This means that going anywhere you want to go by telephone will be easier and faster.

NOW TO TURN from service to dollars. As I understand it, assets of the life insurance companies have grown since the war roughly from 45 billion dollars to 83 billion dollars or thereabouts. Total capital of the Bell System has gone from 4 billion dollars to 11½ billion dollars—an even greater proportionate increase.

Our expenditures for new construction during the nine post-war years have averaged about a billion two hundred million dollars a year. They will be close to a billion four hundred million this year, and perhaps a little more in 1955. Of special interest to you, our need for new money is roughly in the order of 200 million dollars every three months.

It would be pure speculation to guess just when Bell System capital will total

20 billion dollars instead of 11 billion plus, or when we may be owned by two million share owners instead of 1,300,000.

But I would be sure that day is coming—just as you must foresee that instead of having obligations of a mere 300 billion dollars of life insurance in force (or something more than the entire national debt), you are going to be responsible for 500 billion or 600 billion dollars or whatever it may turn out to be.

Now I've talked a lot of figures. From them it's clear that we in the Bell System are going to stake more billions on the future—many more. That's what all our experience and study tell us is right and necessary to meet the tremendous growth that is surely ahead in this country of ours.

I'VE BEEN QUOTING FIGURES partly to stress the sheer immensity of them, but mainly to lead up to what is most on my mind. Exact amounts don't matter. What really matters to me, as it must to you, is that what we are doing has such enormous impact on the community.

It isn't just a situation of big business getting bigger. It's also a matter of becoming a bigger *part* of each community: a bigger part of the United States, a bigger part of New York City, a bigger part of Springfield and Junction City and Punkin Creek. What we do and how we do it means so much—and becomes more and more important all the time.

Others know this just as well as we do. The country knows it, New Yorkers know it, and they know it down in Punkin Creek.

First off, I think most people see the benefits to them. Americans everywhere, in my opinion, are seeing more clearly the direct relation between bigness in industry and the rise in our standard of living.



“ . . . becoming a bigger part of each community . . . ”

They know large-scale organization is essential to the country's welfare and security. They are beginning to understand that big business is largely responsible for the many material benefits of life they enjoy.

But—

The more widely Americans do realize this, the more also, it seems to me, they are coming to hold big business to what *they* believe are its *total* obligations.

And if great enterprises such as you and I are concerned in managing are in fact a basic foundation for our kind of life, then our obligations of today and tomorrow may well be broader—far broader—than we have ever conceived them to be.

In fact, I'll say it this way: If we whose services so vitally affect the community are not successful in working for the good of the community, *from the community's point of view*, then that view will

have scant place for us as we are now constituted.

NOW I'M AWARE this is not an original thought. And I'm glad that is so. I'm glad so many large organizations are going on the premise that they must have a deep concern in community well-being.

Perhaps one way to express it is this: that the bigger we grow, the more we must make sure we stay small in the community.

I mean by that—make sure we keep our closeness and intimacy with the people in every town and neighborhood; make sure we are in and of each community, not outside, above, or against it; make sure that the people who carry on our business in every city and town do not think of the company's interest as one thing and the community's interest as another.

You don't have to define what makes a good community to know that it is not one



“ . . . in working for the good of the community . . . ”



" . . . the people who carry on our business in every city and town . . . "

in which those who have the most to contribute are thinking only of themselves. That remains true even where ideas differ widely on what constitutes the public interest and how it can best be served.

I would go farther and add that self-serving will not even promote self-interest, for in this country the community still keeps more power than any of its members and that is likely to continue.

It is only by staying small and close and intimate in the community, in my estimation, that we shall have the chance to show that human satisfactions may be achieved in the largest degree through the operation of private enterprise.

AND HOW practically can we go about it?

There's only one way I know. It's to help each member of our respective organizations to do his full part right where he lives and works. And I think this is the essential

that we have to start with when we speak of "decentralizing."

Certainly I have no question about the need to push out authority as far as possible—all the way out to our men and women who are really in and of the community.

But in order to carry the load adequately, they must be broad people.

And how can we assist them in getting the experience, the skill, and the breadth of view to do this job well?

Until better ways can be found, it seems worth while to us in the Bell System to take people off the job for long enough periods so that they will have time to listen, think, read, and discuss—get into their minds a broader concept of what their job really is—and strengthen their talent to carry it out.

Further, it has seemed to us that the place to start is within the top manage-

ment group itself, so that is where we are putting a good bit of our first effort.

I want to say very humbly that we don't regard what we are doing as anything like an adequate answer to the questions I have been raising.

We are just groping. We're in the first grade. But you have to make some kind of start if you want to learn anything—and that's what we are trying to do.

Our most substantial effort, in numbers of people, is what we call the Bell System Executive Conference. Every month a new group of forty department heads from all sections of the country is meeting at Asbury Park, New Jersey, for a four-week conference. This has three objectives: to broaden thinking and outlook, to increase present effectiveness, and to stimulate interest in further self-development.

We started this about 15 months ago, and 700 key executives in our business will have participated by June of next year. The men are generally in their late 40's and have been in the telephone business 25 years or more.

A typical group will include a plant construction and maintenance head from Canada and an accounting manager from the Deep South; a man who has charge of all telephone business offices on Manhattan Island and another who heads the traffic forces in Wyoming. Along with these and other operating men there will usually be engineers, laboratory scientists, manufacturing superintendents, lawyers, a medical director, and a few other staff people.

They live and eat and study together. Morning sessions are largely case problems, with guest speakers in the afternoon.

" . . . time to listen, think, read, and discuss . . . "





“ . . . testing the values of study in the humanities . . . ”

Many of the speakers are from fields other than business. The group considers the ideas of economists, sociologists, psychologists, historians, and others.

One will handle the economics and politics of the Federal budget, or perhaps farm price supports. Another will discuss minority groups and American business. We even have talks and discussions on international problems. In every instance, the talks by guest speakers are preliminary to questions and free discussion.

There is no teacher-to-pupil instruction in the usual sense; no preaching. There is no asking or advising the conferees to

“think and act in the interest of the community.”

But does the give-and-take of minds help to broaden viewpoints? Does it stimulate new insights—give a man a better understanding of the relation between his job and the world around him?

I can't help but think it does. And those who are taking part seem to think so too.

Maybe some different approach would be better, but we can only learn that through experience. Certainly we keep introducing new ideas into this one. And the committee in charge isn't content with

only a four-week program. They continue to send the conferees reading materials after they are back home, and are considering what to do about further sessions after a couple of years or so.

ANOTHER DEVELOPMENT, which is purely experimental, is a program conducted by the University of Pennsylvania especially for the Bell companies. At the suggestion of The Bell Telephone Company of Pennsylvania, the university a year ago started The Institute of Humanistic Studies for Executives.

This is a ten-month full-time program, and away off the conventional path of business education. Last year there were 17 men in the group, this year 19—most of them a little younger than those in the Asbury Park conference.

The program is testing the values of study in the humanities: literature, art, history, music, philosophy, the social sciences. This is a radical departure. Will it help us toward better ways of growing broad-gauge people?

I can only say—we have hopes.

And we are probing in other ways too: using after-hour and other programs offered by several universities, taking part in the Sloan Fellowship program at M.I.T., entering our people in courses conducted by the American Management Association.

We are bringing guests in to our regular management conferences.

But we are still just nibbling at the edges of the whole matter. In the Bell System we have a group of about 10,000 people in the third level of management and above. There are 70,000 more in the first two levels. These experimental stones we are tossing in the pond have a long, long way to send their ripples.

TO THINK and to act in the community's behalf is not an attitude that can be imposed. It is not brought about through a procedure. It can't be produced by direction.

But if we can create a climate in management that nourishes this way of life, then it will grow spontaneously and naturally and not at the expense of other obligations of management.

Perhaps we are learning a little about how to build such a climate. That is the most I feel justified in concluding at this moment. But I hope very much that we and others in industry will continue to work at it, even though we may fumble a bit in the process.

All we need to do is act on our faith that the job deserves our best efforts. The result, I am convinced, will be of lasting benefit—in our own affairs, to all business, and to the country.

Three deadly hurricanes, assailing the East in seven weeks, find Bell System Plant groups ready—with manpower, materials, and organization—for any test

PLANNING AHEAD TO MEET DISASTER WHEN IT HITS

JOHN H. MITCHELL

PLANT DIVISION, O. & E. DEPARTMENT, A. T. & T. CO.

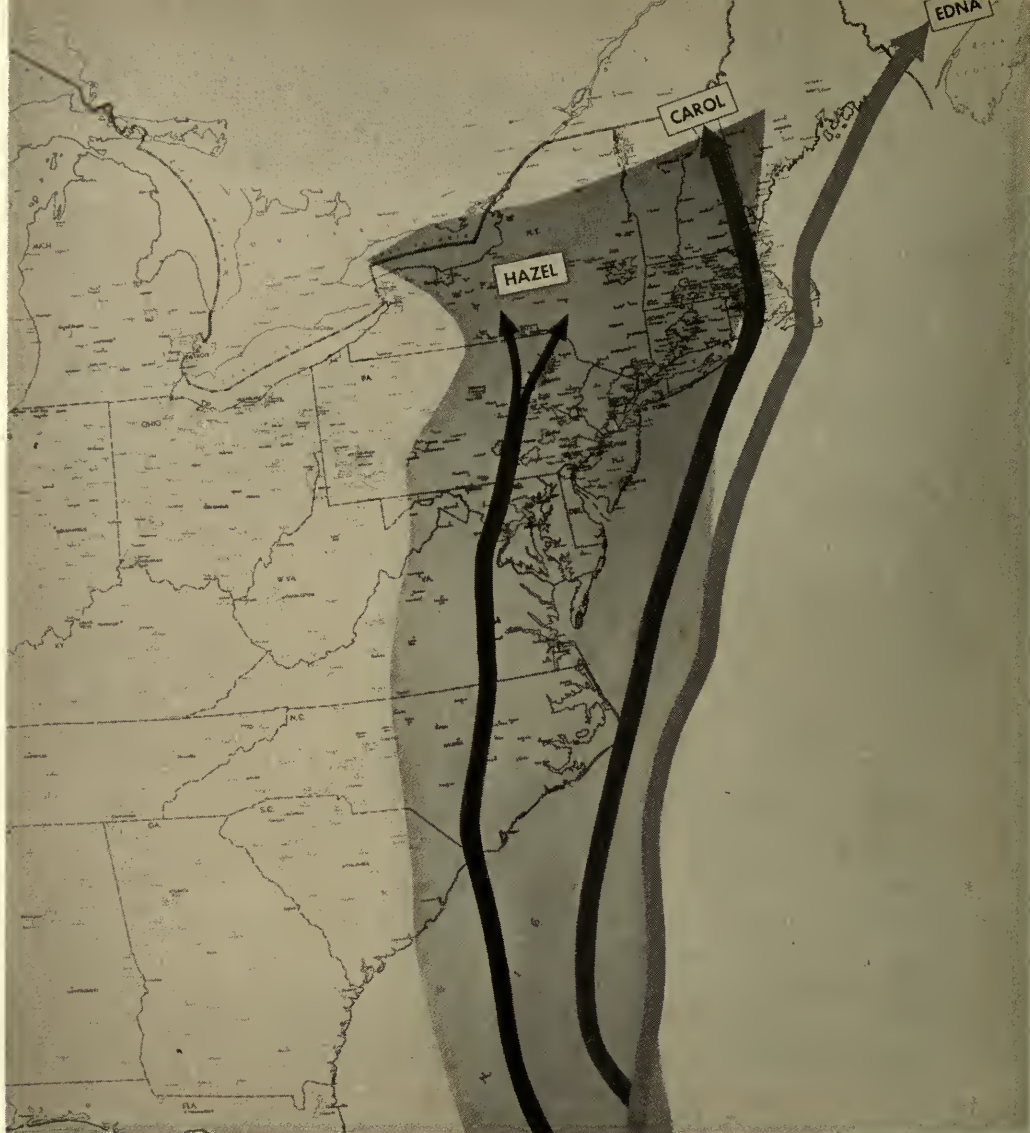
THREE VICIOUS HURRICANES, attacking in rapid-fire order this past Fall, inflicted the greatest damage to telephone plant ever experienced by the Bell System during so short a period. At no other time in history have Bell companies been required to restore service to over a million telephones, and spend seventeen million dollars doing it, all in the space of just seven weeks.

On August 31 the first of the hurricanes, nicknamed Carol, roared through New England, leaving 334,000 telephones dead and buried in wreckage. From this tangled destruction telephone people resourcefully gathered together enough loose ends to restore normal service in just six days. But the job of cleaning up the outside plant went on. Home forces, still assisted by some of those who had earlier answered the call for help, righted tilting poles, re-sagged strained wire, straightened twisted cable—did everything necessary to return the battered plant to its former tidy condition. No sooner had the visitors set their last pole, picked up their tools and looked

homeward than they heard the ominous warnings of another hurricane. So they stayed on; and some who had already hit the road turned around and headed back when summoned on a Connecticut parkway.

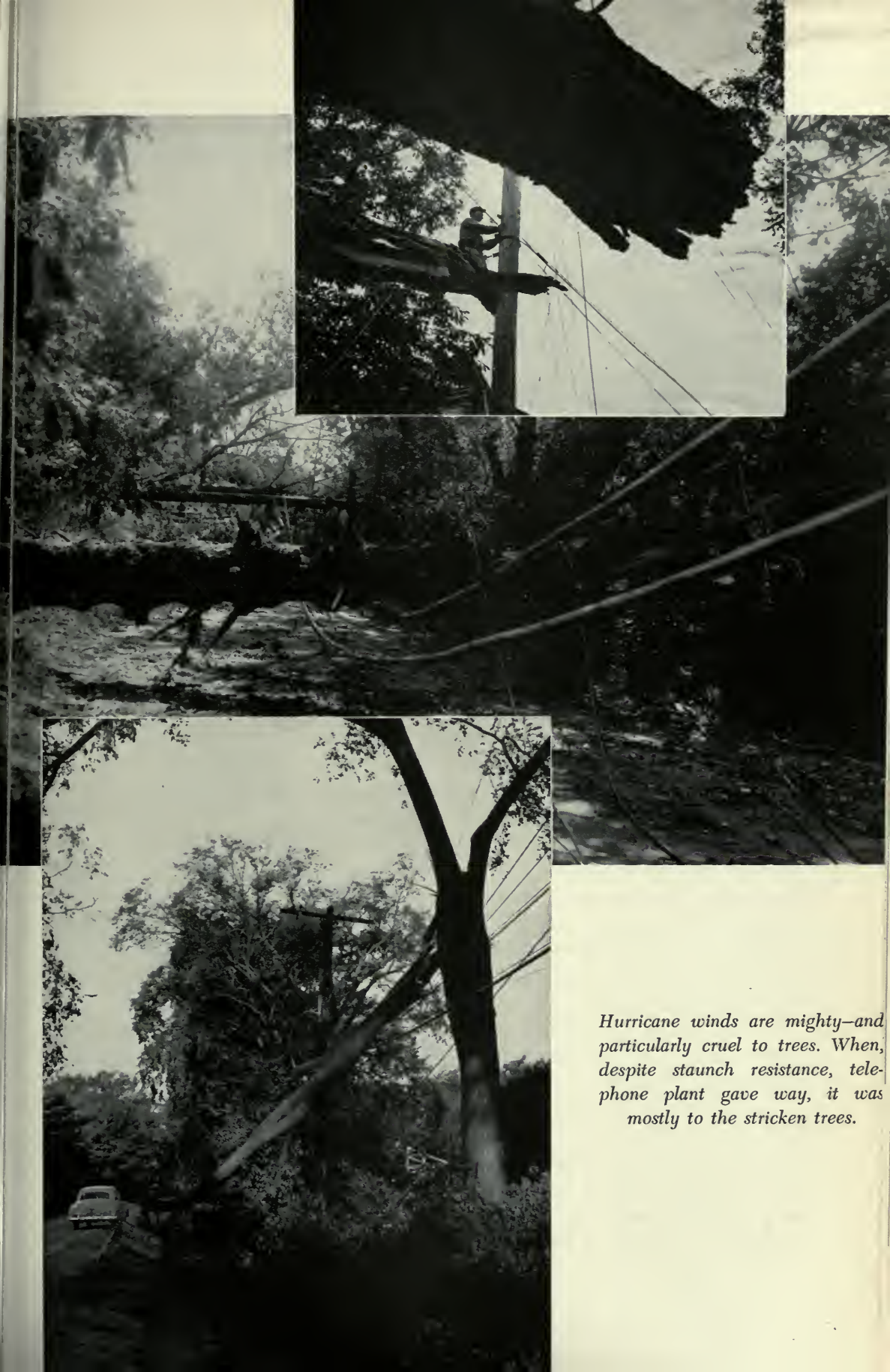
Then on September 11 they watched as much of their good work fell victim to the second hurricane in 11 days. Edna, so called, a fiercer hurricane but choosing to travel more by sea, swept away service from 295,000 telephones, many for the second time, as she skirted north and then east along the New England coast. Undismayed, telephone people set to work again. Neighboring forces returned to do over much that they had just completed. At the end of five days, service was once again normal for an anxious public.

As the days turned into October, hurricanes had become a part of the past to most people. Two weaker sisters, dubbed Florence and Gilda, inconspicuously stayed close to home in the Gulf of Mexico or Caribbean. With two powerful storms in



1954 Hurricanes

	"Carol" August	"Edna" September	"Hazel" October
<i>Service Interrupted</i>			
Telephones	334,000	295,000	448,000
<i>Restoration Forces</i>			
Total Participating	11,400	11,500	21,750
Borrowed People	1,658	1,947	None from
Borrowed Vehicles	900	1,100	Other Companies
<i>Estimated Restoration Costs</i>			
Expense (Millions)	\$4.5	\$4.1	\$4.2
Capital (Millions)	1.7	1.4	1.3
Total (Millions)	\$6.2	\$5.5	\$5.5
<i>Restoration Interval</i>			
Days	6	5	6



Hurricane winds are mighty—and particularly cruel to trees. When, despite staunch resistance, telephone plant gave way, it was mostly to the stricken trees.

one year, it seemed that history enough had been made when during early October the name "Hazel" first appeared on official Weather Bureau advisories. Although she was characterized initially as a "small hurricane," telephone people followed her with a suspicious eye sharpened by painful experience. Gradually she generated great strength and, as if waiting to muster all of her fury, she hovered in the Caribbean area for several days. Suspicion turned to concern as she slowly started her journey northward, demonstrating her destructive power at Port au Prince while passing between Haiti and Cuba. By the morning of October 14, Hazel swirled furiously 300 miles off the coast of Florida, moving northward rapidly. Although her course could still turn seaward, the time had come to prepare for the worst. So telephone people up and down the coast took stock of their manpower, their supplies, and poised to fall in right behind her.

IT IS WELL they did, too, for on the morning of October 15 Hazel struck inland across the coast of the Carolinas and turned northward to pierce the heart of the Northeastern states. Her timetable carried her through Virginia by day, over Washington, D. C. and into Pennsylvania by nightfall. Knowing no hours, she roared on through the night over New York State toward Canada, brushing twice-battered New England on the way.

On her rampage she spread her destruction with surprising impartiality, for Hazel misbehaved—she did not dissipate rapidly, as hurricanes usually do when traveling overland. In central New York and Pennsylvania trees were uprooted, buildings shorn, railroads blocked and power lines scattered nearly as severely as in Virginia or Maryland. Unable to hurl her violent

winds over the Allegheny Mountains, her western flank reached out to join an approaching cold front in dumping a deluge of flooding rain on western Pennsylvania and northern West Virginia. Even by the time she reached Canada, she still had enough of her watery fury to lend a damaging hand to heavy rain already falling there.

Disruption of telephone service followed the same pattern—and it was severe. Some 448,000 telephones were silent in South Carolina, North Carolina, Virginia, West Virginia, Washington, D. C., Maryland, Pennsylvania, New Jersey, New York, and the lower New England states. An additional 43,000 telephones succumbed to floods in the Toronto area.

Yet telephone plant withstood the furious blasts remarkably well—especially the long distance portion. As during Carol and Edna, it was the trees that gave way to the overpowering onslaughts of Hazel's gales. Large and small, stricken trees or their limbs, entwined with crackling power wires crashed into telephone lines to tangle wire, mangle and burn cable, tug at poles.

So for a third time Plant people picked up their tools, loaded their trucks, and set out on the discouraging task. Over 21,000 of them this time, and 5½ million dollars were needed to put the telephone house in order. But they needed only 6 days to return service to normal.

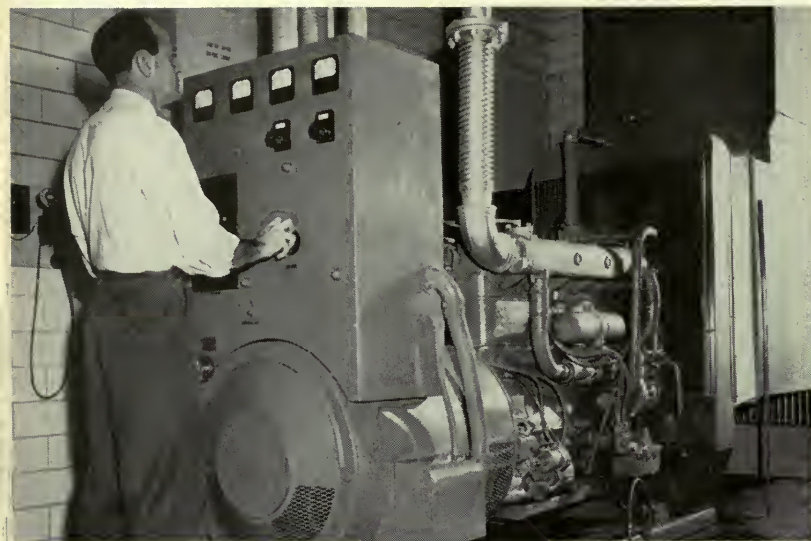
Only an organization of great resources—men, materials, equipment and money—could withstand such a staggering loss. And only an organization steeped in the broadest spirit of service would undertake so willingly such a difficult task.

THERE ARE COMPELLING REASONS why the Bell System should be this way. Telephone

ged plant and clean rights-of-
thwart rigors of rugged coun-
try—and hurricanes.



*A covering of earth protects many
cables from violent acts of nature,
but only diligent campaigning can
protect them from deeds of men.*



To insure a steady flow of electrical power—the life blood of telephone apparatus—emergency power plants, permanent or mobile, take over when regular sources fail.

service is important to everyone, everywhere—but most important in time of emergency. By public consent the Bell System and the Independent connecting companies are the only source to which the public can look for telephone service. That there is an obligation to furnish the highest quality, most reliable service possible is beyond question. That this obligation has been met is evidenced by the public confidence developed over the years. Today even greater reliability is demanded by more exacting communications systems, growing in size and number, and by the dependence of the nation's defense on Bell System services. So Bell System people are "service conscious"—conscious that their facilities must resist service interruption, conscious that service must be restored quickly if interrupted.

Plant Is Reliable—On the Outside

TO RESIST SERVICE INTERRUPTIONS, telephone facilities are made to be reliable. Bell Telephone Laboratory physicists, chemists, mathematicians and engineers combine their ingenuity to develop stable equipment and to determine the most durable materials. Bell engineers design out-

side plant to be sound; construction forces build it to be sturdy. Important rights of way are maintained free of obstructions and clear for accessibility. Many cables gain the additional protection of being underground even though increased cost and the need for dropping off services house-by-house limits this type of construction. Many are filled with gas under pressure to keep out water. Plant protection programs are vigorous to guard against the greatest single hazard to underground cables: the excavating and digging activities of others. These are but a part of the outside plant program aimed at minimizing service interruption.

—And in the Central Office

IN THE CENTRAL OFFICE TOO, Bell System people strive for reliability—in design, operation, and maintenance. For instance, development engineers design carrier systems that will automatically measure their own performance and compensate for normal variations and certain irregularities. Complex intertoll switching systems, with minds of their own, test trunks or lines automatically and help to analyze their own faults. Alarms to signal impending

Planning Ahead to Meet Disaster

failure and testing provisions are integral features of much of the equipment. "Patching" facilities to maintain continuous service by rerouting, protection channels which automatically back up important micro-wave and coaxial systems, spare equipment ready for quick replacement duty—all play a part in safeguarding service. And of great importance, emergency power plants, permanently installed or mobile, ensure a constant supply of electrical power, the life blood of telephone apparatus.

And the Bell System Prepares for Service Restoration

IN SPITE of such care, plant does fail upon occasion, when confronted with situations which economically it cannot be designed to withstand. So the Bell System prepares for swift, orderly restoration. Critical services may often be involved and they demand immediate attention. Plant damage may be extensive, but in the large web of Bell System circuits an alternate route can almost always be found. All vital services receive priority in restoration. High on the list is the community whose communications have been cut off from the outside. By whatever means possible, land line or radio, it is a primary duty to establish at least one long distance circuit as an outlet for emergency calls. Of equal importance are vital government or municipal services, broadcasting networks, and other important commercial circuits. All services not rerouted are returned to use as rapidly as damaged plant is repaired.

Plant Restoration Requires Men

RESTORATION of the plant itself requires men, materials, coördination—and, for the severe case, plenty of each. Plant Depart-

ment manpower, of course, is arranged and scheduled to do the most efficient day-to-day job. Much time is spent to see that they are well trained and money is spent to see that they are well equipped. Plant and problems being basically similar throughout the System, they all follow the same practices, use standard equipment. Although the force in any particular locality is large enough to handle only the smaller emergencies, additional men with the same training and equipment in a neighboring area are always ready to lend a hand.

—And Materials

THE WESTERN ELECTRIC COMPANY furnishes most materials and supplies used by the operating companies. Equipment, tools, materials, and miscellaneous supplies—items standardized for use by these companies—comprise Western's line. The companies order these through their supply organizations from their local Western Electric Distributing Houses—29 of which are located throughout the country.

The operating companies keep in their storerooms plant supplies required for the routine job. In limited amounts they keep special emergency stocks such as spare reels of cable, test equipment, and quantities of paired wire or coaxial patch cords for spanning bad sections of cable. These are usually sufficient for the minor emergency. During the large emergency the Western Electric Company can be relied upon to deliver in quantity day or night. When stocks in local distributing houses dwindle, they make rush shipments from distant houses or factory stocks.

—And Coördination

BUT FORCE AND MATERIALS ALONE will not do the job. Effective use of these requires



While awaiting repair of plant, emergency service can be temporarily established. Telebus, emergency radio, or mobile service.



coördination or direction—and this must come from the organization. The Plant organization in one area is similar to that in other areas throughout the System. Beginning with the craft people in the field or test centers, the line organization focuses upward through the foreman, supervising foremen, service or construction supervisors, district managers, division superintendents, on up to the area and general managers. This “chain of command,” meeting best the normal business requirements, easily gears itself to the rushed tempo of emergency situations.

Staff organizations in the district and at higher levels normally follow the day-to-day operations, keep an eye on performance results, review working practices, prepare reports, as well as performing many other duties to assist the field people and the manager in running a “taut ship.” In time of emergency, this is a particularly valuable group which performs a special coördinating function by summarizing damage conditions and arranging for necessary restoration needs.

All Play Their Parts

ALTHOUGH THE LARGEST JOB during an emergency usually falls to the Plant Department, essential roles are also played by the Traffic Department, which mobilizes to handle swelling traffic volumes; the traffic control groups, who constantly maintain the best balance between shifting traffic loads and available circuits; the Commercial people, who take the initiative in seeing that hospitals and other vital public agencies do not go without telephone service; Accounting people, who help the field in charging time and expenses to proper accounts; and Public Relations groups, who keep the public informed about restoration progress. Their

organization and administrations, like that of all Bell System departments, must function equally well during the day-to-day operation or the emergency. Minimum departure from established channels and procedures is fundamental to orderly restoration.

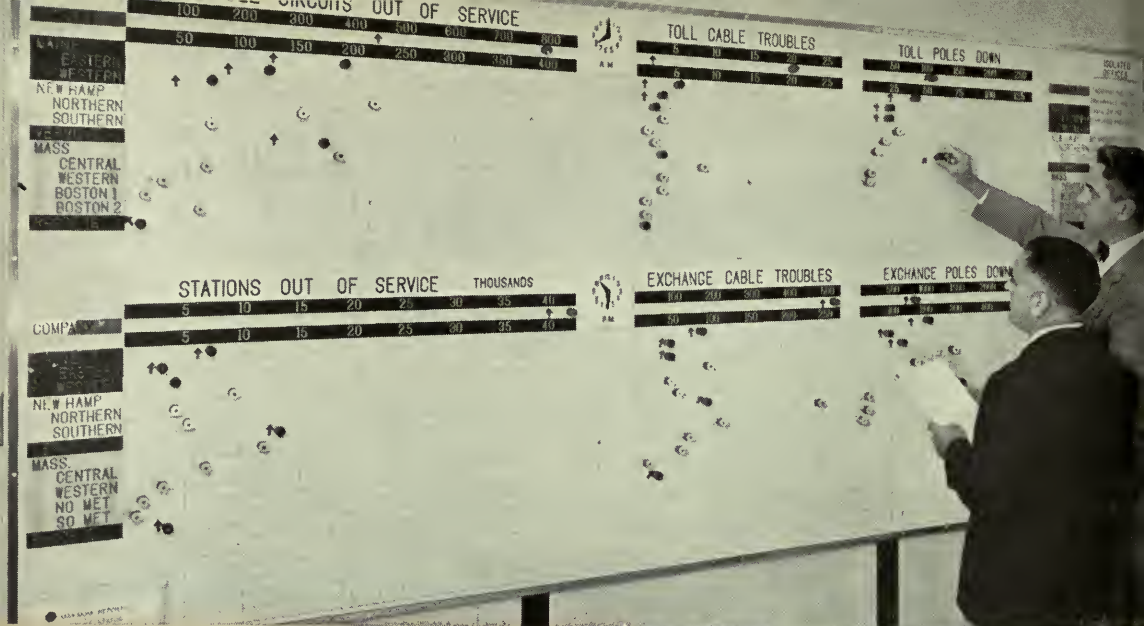
Restoration—The Lesser Emergency

IF RESTORATION POTENTIAL in ample degree does exist—and it does—then how well does it function when called upon. Take, for example, a “minor” emergency—say the failure of an important underground trunk cable last year. A plumber, placing a new water connection, had driven a pipe through the conduit into a 600-pair cable. It didn’t take long for a reaction. Immediately, lights and bells in the central offices signaled serious trouble, while calls from subscribers flooded repair service. Central office forces jumped to rerout as many vital services and trunks as possible, to begin their electrical measurements for determining the location of the trouble, and to alert construction and cable repair crews. By the next morning a new piece of cable, on hand in the store yard, had been pulled in between manholes and cut over, and service had been fully restored.

This emergency, minor in scope, was coördinated by the district organization, and disposed of by local construction forces using storeroom supplies normally stocked. They handled it easily enough—so much so that it hardly seemed like an emergency.

—The Larger Emergency

OTHERS ARE LARGER, THOUGH—like a flood last spring. Damage was heavy and extended through the territory of several districts. To insure over-all coördination, it was necessary to activate the Restoration Control Center at company headquarters.



Restoration calls for coördination. Here are some of the places and some of the means for exercising this coördination during last Autumn's emergencies.



Under instructions received from this center, manpower moved in from other areas of the company to assist the local forces. Supply requirements were too great for the local Western Electric Distributing House; however, the restoration crews would hardly have known it. Rush deliveries from other areas supplied everything as needed.

—The Disaster

THE RIGOROUS TEST comes during the major disaster—like Hazel, for instance. Damage was extensive, widespread—the need for the telephone great. Yet even before the winds had blown themselves by, Commercial and Plant Department people were working together to restore service of some kind to hospitals, disaster relief centers, and other civil agencies. To do this, Plant men ran temporary wire, patched up cables, and in some cases Commercial people manning company vehicles equipped with mobile radio telephone service stood by to handle emergency calls. Using portable radio equipment designed for just such service, they reconnected communities cut off from communications with the outside. Testing and central office people rerouted other vital services to the extent possible, in accordance with their prearranged restoration plans.

Meanwhile, the Plant Department looked to repair of its outside plant: the most arduous task of all. Muster of restoration forces and materials appeared Herculean. Yet service was back to normal in just six days. And they accomplished it in basically the same manner as repairing the cable or cleaning up the flood damage. For a major disaster like Hazel, though, there must be over-all restoration control at a higher organizational level—a level high enough to encompass all of the operating

areas affected. Normal line organization, augmented by the company restoration control centers, provided coordination in the field. Over-all guidance fell to the A. T. & T. Co.'s plant operation engineer's group in New York City.

Here, for several days prior to Hazel's striking inland, those in this group normally responsible for plant damage matters anxiously plotted her path. Early Thursday, the eve of her charge inland, they speculated on her future course. Projected straight, her course crossed the Carolina shores. A smooth curve would carry her seaward, and this was still possible. Passing time reduced the chances—chances they could no longer afford to take. So they alerted those companies north of the straight line, then neighboring companies who might have to lend assistance.

HAZEL FOLLOWED the straight line. The following morning all the necessary accoutrements of a disaster control center were in place. Engineers and group heads from the plant operation groups—men with valuable field experience gained during prior assignments in the operating companies—staffed the center. Those on the early trick went about their duties. Three were talking on the special emergency telephones: one to a mid-western company learning the number of crews it could dispatch if needed, the other two exchanging local weather bulletins with two operating companies. Another plotted Hazel's latest official whereabouts on the large wall map—170 miles east of Savannah, Ga. according to the 5:00 A.M. Weather Bureau advisory.

Shortly after 9:00 A.M., more than 500 miles away, Hazel thundered into North Carolina. In a short time the stark outline



Providing ample supplies when and where needed is Western Electric's role in such emergencies.

of her path would unfold, as the damage reports came in from the companies. At first sporadically, then in a chorus, the telephones rang. "—company storm center reporting. Six thousand stations now out of service, first count of poles broken or down not yet in, 3 central offices now on emergency power. Patrols are out now; still raining hard but wind is down. Will call when we get a later count."

This information, originating from central office and reconnaissance crews which began their surveys right on the heels of the destruction, formed the basis for restoration plans at all organization levels. At the A. T. & T. Co. control center one of its members posted the figures on the grim ledger—a mural-size chart tabulating type of damage versus operating area—and added up the new total. Another, flashing a glance first at the map, then at the damage summary, then back to the map, dictated the next bulletin to be issued for the use of company officials, Western Electric, other department staff groups enmeshed

in the emergency, and for Public Relations—who kept the public so well informed.

Forms for recording movement of men and vehicles between companies lay ready but unused on a table. For Hazel spread her destruction over such a large area, it was not necessary to shift forces between companies. However, during Carol and Edna, when damage was heavily concentrated in New England, this center arranged for the movement of large numbers of men with their vehicles and tools into that area. During Carol, the New England Company's call for help—received in terms of line gangs, splicing crews, reconcentration teams, and installer-repairmen—started 1,650 men with 900 vehicles rolling from as far away as Washington, D. C. For Edna, 1,950 men with 1,100 vehicles, including one entire Plant Division from the Michigan Company, came by convoy and by rail to add their might to that of the New Englanders.

The Western Electric Company furnished the third major ingredient for restoration: materials and supplies. Their local distributing houses received the emergency orders from the companies in need. Even before local stocks were depleted, Western had more on the way from other distributing houses or factories, delivering much of it directly to the point of use. A special coördinating group in Western Electric's New York headquarters worked closely with the A. T. & T. Co.'s storm center to anticipate needs and prepare for them. The Western Electric Company made the necessary transportation arrangements which sent the Michigan Plant Division, bag and baggage, rolling eastward on two special trains. The perfection to which the supply role was played was evident in that there were no known in-

Planning Ahead to Meet Disaster

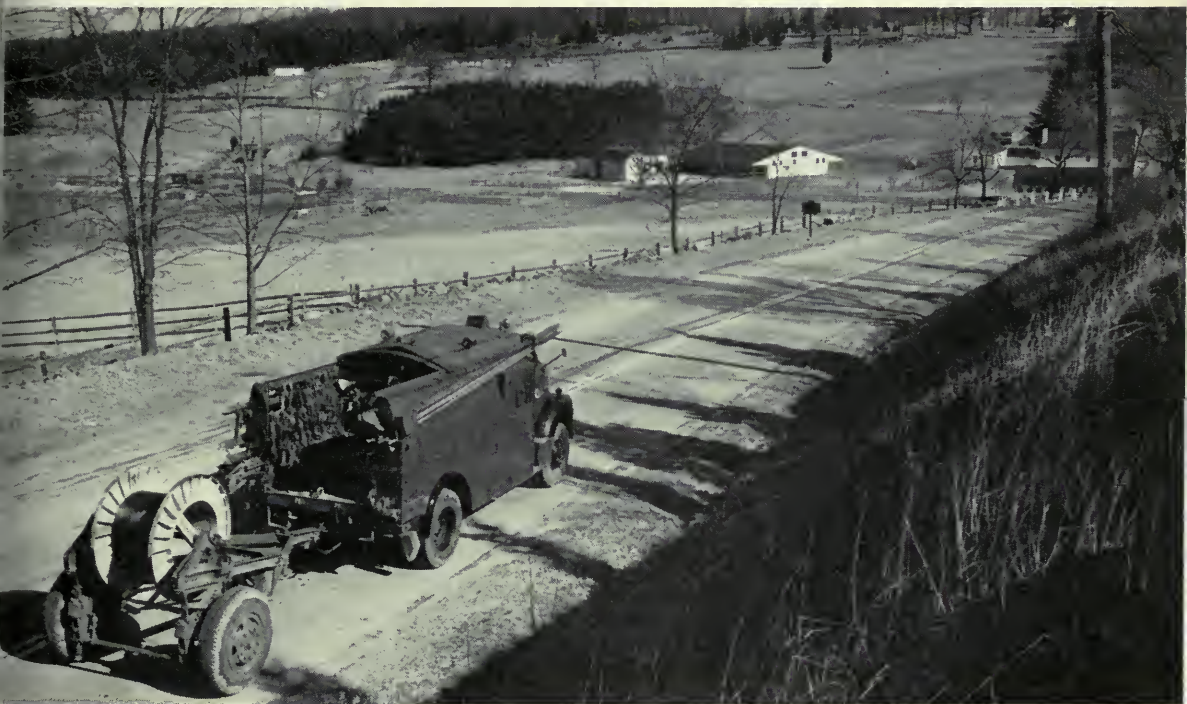
stances where a lack of supplies materially retarded restoration activity.

The Result

THE REMARKABLE RECOVERY of telephone facilities during a period of severe destruction unprecedented in its repetitive rate is not the product of chance. Rather it is the product of an earnest recognition of an obligation, *first*, to provide the public with the most reliable service possible and, *second*, to make the fastest possible restoration when that service does fail. Every phase of furnishing service must be devoted to that end. Plant must be rugged, men diligent, supply sure, and organiza-

tion sound—to resist failure or to correct it. And by way of a third point, the Plant and Engineering Departments are earnestly reviewing the damage resulting from 1954's unprecedented siege, studying the performance of recently introduced methods and materials, seeking whatever clue may lead to improvements for another day and another emergency—whatever may be its nature.

Last Autumn's catastrophic blows proved these points fully. They did more; for the recuperative powers thus demonstrated proved also the Bell System's power, competence and preparedness to face up to any emergency that may strike.



The countryside soon returns to days and ways of peace.

Name prefixes of local significance must give way to standard identifications as growth of nation-wide dialing increases importance of easily grasped words

“WHAT’S YOUR TELEPHONE NUMBER?”

STANLEY G. ERICSON

Traffic Facilities Engineer, A. T. & T. CO.

THIS QUESTION is probably one of the most frequently asked of all—along with “What time is it?” and “How’s the weather?” And the answers to it are growing more and more to sound alike, at least as far as concerns the name portion of the number, no matter in what part of our country the question is asked.

Why is this? Why this change from names which had local significance to those that are “neutral” or “national”? For that matter, why have names at all?

To understand what is happening now, it is necessary, as in so many other inquiries, to go back a bit and see what has happened in the past.

In the very early days of the telephone business, it was possible to be connected simply by giving the name of the subscriber to the operator. With only a few subscribers, the operators could easily remember that the blacksmith shop was 80-J and the drygoods store was 50. Even today, in the very small communities there is still some calling by name and, occa-

sionally, a nostalgic response by an operator, “I know he’s not in his office because I just saw him go into the barber shop.”

But along with whipsockets and anti-macassars, these procedures became outmoded with the passing of time. As the telephone population grew, each subscriber had to be identified by a telephone number—a more impersonal method but a necessary one. Telephone directories and calling by number became required adjuncts to satisfactory telephone service. In the earlier days, these telephone numbers were composed of numerals only, and, as long as there was only one central office in a city, there was no need for a name-and-numeral combination.

As growth continued, the physical capacity of the first office in a city was reached and a second or “branch” office had to be opened. This brought with it the need for differentiating between the first and second in some manner. The choice lay between designating the offices

LIST OF SUBSCRIBERS.

New Haven District Telephone Company.

OFFICE 215 CHAPEL STREET.

February 21, 1878.

<i>Residences.</i>	<i>Stores, Factories, &c.</i>
Rev. JOHN E. TODD.	O. A. DORMAN.
J. B. CARRINGTON.	STONE & CHIDSEY.
H. B. BIGELOW.	NEW HAVEN FLOUR CO. State St.
C. W. SCRANTON.	" " " Cong. ave.
GEORGE W. COY.	" " " Grand St.
G. L. FERRIS.	" " " Fair Haven.
H. P. FROST.	ENGLISH & MERSICK.
M. F. TYLER.	NEW HAVEN FOLDING CHAIR CO.
I. H. BROMLEY.	H. HOOKER & CO.
GEO. E. THOMPSON.	W. A. ENSIGN & SON.
WALTER LEWIS.	H. B. BIGELOW & CO.
	C. COWLES & CO.
	C. S. MERSICK & CO.
	SPENCER & MATTHEWS.
	PAUL ROESSLER.
	E. S. WHEELER & CO.
	ROLLING MILL CO.
	APOTHEC ARIES HALL.
	E. A. GESSNER.
	AMERICAN TEA CO.
<i>Physicians.</i>	<i>Meat & Fish Markets.</i>
Dr. E. L. R. THOMPSON.	W. H. HITCHINGS, City Market.
Dr. A. E. WINCHELL.	GEO. E. LUM.
Dr. C. S. THOMPSON, Fair Haven.	A. FOOTE & CO.
	STRONG, HART & CO.
<i>Dentists.</i>	<i>Hack and Bowling Stables.</i>
Dr. E. S. GAYLORD.	CRUTTENDEN & CARTER.
Dr. R. F. BURWELL.	BARKER & RANSOM.
<i>Miscellaneous.</i>	
REGISTER PUBLISHING CO.	
POLICE OFFICE.	
POST OFFICE.	
MERCANTILE CLUB.	
QUINNIPIAC CLUB.	
F. V. McDONALD, Yale News.	
SMEDLEY BROS. & CO.	
M. F. TYLER, Law Chambers.	
Office open from 6 A. M. to 2 A. M.	
After March 1st, this Office will be open all night.	

The first telephone directory, issued in New Haven, Conn., less than a month after the world's first commercial telephone exchange was established there.

by name and adding another numeral. The former was chosen in most cases, because it was considered to be simpler—although, if all the future involvements both technical and emotional could have been foreseen, the less colorful but more anonymous all-numeral method might have been selected instead.

Initially, the naming of central offices was a pretty uninspired job. The first office was almost inevitably called "Main" and the second "Branch." There are a good many "Mains" left but "Branch" has almost entirely disappeared because more than one branch office had to be opened. Per-

haps on the occasion of the opening of the second branch office in some city, an explanation was made to all of the "Branch" subscribers who were going to be changed to "North" to the general effect that progress required this change but with three other points of the compass still left it was highly unlikely that any further changes would occur. In some cases this turned out to be correct, and many "Norths" are still in existence, as well as some "Souths," "Easts," and "Wests." However, as we shall see, even some of these staunch and apparently indestructible names became casualties of the shifting nomenclature tides.

[illegible]

Branford 210-1	Prange, John C.	Residence	10 Main
Branford 210-6	Branford Opinion		Main
Branford 210-9	Branford Post Office		Branford Neck, Ct.
Branford 211-2	Cheney B H, Dr.	Residence	Indian Neck, Ct.
Branford 211-3	Hudley Albert	Residence	N Branford
Branford 211-5	Crouch Edward	Residence	Brandy
Branford 211-7	Doolittle T H.	Residence	Pine Orchard, Ct.
Branford 211-8	Double Enoch	Residence	Brandy
Branford 211-9	Engquist A R.	Residence	Pine Orchard
Branford 212-2	Engquist Fritz A.	Livery	Rogers
Branford 212-3	Evans George E, Dr.	Residence	Montowese
Branford 212-6	Foot William W.	Residence	Montowese
Branford 213-7	Guyford C W, M.D.	Residence	16 S Main
Branford 213-8	Goss C P.	Residence	Pine Orchard, Ct.
Branford 213-9	Griffiths S	Residence	10 Main
Branford 214-7	Hamer G A R.	Residence	10 Main
Branford 215-2	Harrison M C.	Hotel Oper.	Indian Neck, Ct.
Branford 215-3	Harrison M C.	Residence	Branford, Ct.
Branford 215-6	Hill Allen H.	Residence	N Branford
Branford 215-6	Hinkley W C.	Residence	Stony Creek, Ct.
Branford 211-4	Hodge Hubert S.	Residence	Gulftown Turnpike
Branford 211-6	Hopson W R.	Residence	Montowese
Branford 211-7	Hosley B F.	Residence	Montowese
Branford 211-8	Hutchins Hubert L.	Residence	Indian Neck, Ct.
Branford 211-9	Hutchinson	Residence	Montowese
Branford 212-1	Isbell Edward E.	Residence	48 Montowese
Branford 212-2	Jackson F L.	Groceries	Stony Creek, Ct.
Branford 212-3	Jurie Charles	Reside	Pine Orchard, Ct.
Branford 212-4	Jones Edward F.	Residence	Rogers
Branford 212-5	Jourdain F & Son.	Coal & Lumber	Harbor
Branford 212-6	Kenyon Albert	Residence	Stony Creek Turnpike
Branford 211-3	Killam Henry	Residence	Short Beach, Ct.
Branford 214-3	Knowles E B.	Residence	Short Beach, Ct.
Branford 211-1	Leahurst Wm.	Residence	Indian Neck, Ct.
Branford 211-2	Leahurst Wm.	Residence	Short Beach, Ct.
Branford 211-4	Manson Magnus	Residence	Pine Orchard, Ct.
Branford 211-5	Maynard M C.	Residence	Stony Creek, Ct.
Branford 211-6	Montowese	Residence	Stony Creek, Ct.
Branford 211-7	Moore J S.	Carrington	Rogers
Branford 212-1	Morgan Robert	Residence	Pine Orchard, Ct.
Branford 212-2	Mowell E A.	Residence	Church
Branford 212-3	Nichols John W.	Residence	Stony Creek, Ct.
Branford 212-4	Norcross Brothers	Quarry	Stony Creek, Ct.
Branford 212-5	N, N H & H R Co.	Freight Station	Stony Creek, Ct.
Branford 212-6	Ortt C H.	Residence	Stony Creek, Ct.
Branford 212-7	Orme & Co.	Residence	Stony Creek, Ct.
Branford 212-8	Orme & Co.	Residence	Stony Creek, Ct.

Not many problem situations so far. It didn't matter if the same name were used in different cities, and these early names were generally simple and easily understood. However, when the naming trail

About this time, a process of determining the phonetic value of office names came into use. A list of proposed names, secured from all possible sources, was prepared and then tested to see how good they were. In making the tests, operators were given the lists and proceeded to read the names over a circuit to other operators, who recorded them as they were understood. The names that were most frequently misunderstood, misspelled, or that required the most frequent repetition, were eliminated. However, since the testing took place en-

tirely within a local area, there still remained many names which, while understandable in that vicinity because of their local significance, were destined for the casualty list with further developments in the telephonic art.

WITH THE PROGRESS of dial service, some new factors were introduced into the name selection procedure. A look at the dial will show some of these factors. One that is immediately apparent is the absence of a "Q"; therefore, no more "Quincy's" or "Quarry's." The letter "Z," if it appears on the dial at all, is placed in the tenth opening, the one used to dial "Operator," and so no names beginning with "Z" are usable. The use of "Zenith" is thus precluded, and it's probably just as well, for the possibility of its opposite, "Nadir," suggests itself—

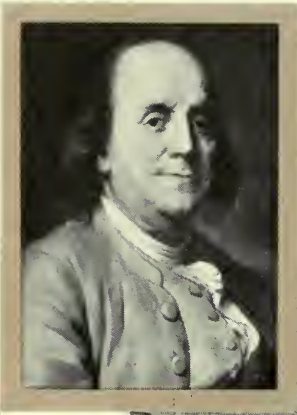
which raises an irrelevant speculation as to why "Zenith" is so much better known than "Nadir."

In the earlier days of local dialing, the first two letters, followed by the numerals, were dialed. When this began, some name revisions had to be made. There could not be a "Market" and a "Main" in the same city, nor an "Adams" and a "Beacon." Sometimes this meant the elimination of a name that had been in effect for a long time, and such an undertaking was not without its problems—to use an understatement.

With the two-letter approach (and here maybe another look at the dial is advisable), there were and are 64 possible combinations. The letters begin in the second opening and continue through the ninth. There are, then, eight possible first letters

[illegible]

Listings in the current Manhattan (New York City) alphabetical four-column directory illustrate the 2-5 numbering plan.



"Franklin" and "Bowling Green" are historic names which have served as central office designations and have thus become telephone number prefixes.



to be combined with eight possible second letters, or $8 \times 8 = 64$. Why only eight and not ten? The tenth opening's unsuitability has been previously accounted for and the first opening, occupied exclusively and aloofly by the numeral "1," was not deemed at the time to be sufficiently eligible to be endowed with letters because of a hovering specter called "preliminary impulse." In an era when most of the instruments were of the erect "desk stand" type, the process of unlatching the receiver from its

claws was calculated to cause an unwanted impulse to be transmitted to the dial machine. The machine was arranged to absorb this preliminary impulse, and as a result the first opening became, and still remains, unlettered.

Of the 64 possible combinations, there were and are four which are ordinarily not used because of the relatively few usable names that could be developed from them, i.e.:

"Adams" and "Trinity" have also become familiar to generations of telephone users as identifying designations for telephone numbers.



<i>Openings</i>	<i>1st Letter</i>	<i>2nd Letter</i>
5-5	J,K,L	J,K,L
5-7	J,K,L	P,R,S
9-5	W,X,Y	J,K,L
9-7	W,X,Y	P,R,S

If completely mined, these combinations could produce "Klamath," "Kringle," "Ylang" (a Philippine tree), and "Wrath," all of which lack in various degrees the required characteristics.

With these four out, the possible names for a city were reduced to 60, and in some

cases this was even further reduced by other factors. For example, in one case "Georgia," a 4-3 combination, was so often dialed as GA that it became necessary to strap the 4-3 with the 4-2 combination so that, regardless of the spelling proclivities of the calling customer, the call arrived at the correct place. However, in so doing, another suitable name, "Hamilton," using the 4-2 combination, became unavailable.

In a few of the very large cities, three letter dialing was introduced. Theoreti-



The "Open Sesame" to most callers: a standard telephone dial. The letter "Q" never appears, and this type lacks the "Z" also.

cally, this resulted in there being a maximum possibility of 512 names: $8 \times 8 \times 8$. Impossible spelling combinations reduced this to about 325, but still this seemed to be adequate to handle the growth for an indefinite time.

Now that the outside limits seemed to be settled, the procedure of selection of names that met both the phonetic and dialing requirements became a matter of good judgment supported by technical knowledge. Locally meaningful names were retained wherever they met the requirements, and all seemed well and secure. Tests of names were made every now and then so that there would always be thoroughly acceptable ones available when a new office opened.

Accentuating the Naming Difficulties

BUT ALL was not well and secure. Growth continued,—enough to be threatening to the peace of mind of the nomenclature people. And then there was added to this relatively mild state of disquiet the full impact of intercity dialing by operators. This was an enormous step forward in the improved handling of long distance calls,

but brought with it an accentuation of the naming difficulties.

Passing a name over a circuit by voice is quite different from dialing the first three letters of the name. In the former case a call for a "Taylor" number, for example, generally arrived at a "Taylor" number. But with a distant operator doing the dialing, the call might start off as TAI (for a not unforgivable "Tailor") and land, if it landed at all, at an entirely different number. This difficulty with the orthographic placement of the third letter, together with a demand for more and more central office names, resulted in a change from three letters and four numerals to two letters and five numerals. This is referred to today as the 2-5 plan and is the basic structure of all local numbering plans.

With a numeral substituted for the third letter (the numeral in reality being part of the central office name), not only were the operator spelling difficulties somewhat eased but also the number of possible combinations and hence office names was increased, this time to 540. Why 540? Starting from the 60 described earlier, each

multiplied by 10 gives 600. However, the tenth opening containing the numeral "0" and the "Operator" service code is not generally used and therefore it is $60 \times 9 = 540$.

It was about at this time that the possibility of intercity dialing by customers became a probability, and it was obvious that something further in the central office naming field had to be done. It was one thing for the natives of a city and all telephone operators to dial a particular number in that city, but it was quite another thing for all people everywhere in the United States and Canada to dial that same number. For that is, of course, what the plan of customer dialing of long distance calls sets out to do: to enable these 50-odd million customers to dial each other easily and simply.

"A Multi-Office Country"

UNDER SUCH a concept, the two countries become in effect a huge multi-office city, and a numbering plan to meet this condition had to be devised. As a first step, the countries were divided into areas each designated with a three-numeral code. These areas are geographical in that they follow state and province lines, but in the more thickly populated of these areas two or more three-numeral NPA (numbering plan area) codes have had to be assigned. This is so because no more than 540 central offices can be contained within one NPA code. Each central office within an area must have a different designation, consisting of the first two letters of the name and a numeral, so that when a call gets to the right area it will then get to the right office in that area.

By looking at the NPA map it can be seen that the codes have either a "0" or a "1" for the middle numeral. This plan of coding,

termed the X0X and X1X approach, had as its original concept that those containing 0 would be used where the entire state could be contained within one code, and those containing 1 would be assigned to states where more than one code was necessary. Thus, when the intertoll dialing facilities were fully available, a call to any place in Nevada could be handled on a "destination" basis by the operator's or the customer's dialing 702, followed by the two letters and five numerals of the called telephone. On calls to multi-code states, the proper code would have to be known or be obtained from an operator in much the same manner as telephone numbers are obtained from Information now.

It seemed to be a good plan, and one that had plenty of capacity. The X0X and X1X approach resulted in there being 152 possible combinations available. How? Neither 1 nor 0 are used to start a code, so in the X0X class, there are 8 different numerals to start the code and ten different numerals with which to finish it; therefore $8 \times 10 = 80$. Similarly, in the X1X class; but here codes ending in 11, of which there are eight, cannot be used since they are already in use for local service codes: 211 for Long Distance, 411 for Information, and so on. Accordingly, there are only 72 available in the X1X class. And $80 + 72 = 152$.

It seemed like a large enough figure, this 152, when there are only 48 states and 9 provinces to consider. Again, however, because of continual growth and resulting new offices, the possibility of exhaustion must be foreseen. Recently, the 100th and 101st codes were assigned. The X1X class is being used up faster, and consequently there are a few states (e.g., Florida and Georgia) which have a code in each class. To meet the possibility that at some future

time all 152 would be used up, new equipment will be designed to handle NPA codes of a X01X class which will make 72 more codes available and, with luck, suffice until sometime beyond the year 2000.

The Necessity for Change

TO RETURN to the naming of central offices within each numbering plan area and the need for each office in the area to have a different designation, it was obvious that some names had to be changed. This, on occasion, required some nice judgment and diplomatic negotiations, especially when there were two cities in the same area having an office with the same name.

Also it was apparent in the interests of simplicity that uniformity of numbering must be the objective; that is, each number must consist of two letters and five numerals. Then came the question as to what these two letters should be. In the smaller places, which had never grown beyond one central office, why not retain the locality name as the name portion of the

number? Why not, indeed? The answer lies in the ingeniousness and enormous fertility of mind with which our towns and villages have been named. These, together with names of Indian descent, have resulted in a formidable array of appellations which, while colorful and significant, are insurmountable obstacles to an easy nation-wide dialing plan. Among them are Koeponick, Ephrata, Illahee, Scruggs, Hye, Quiggleville (no Q's available) and Zia (and no Z's). Good names, but they won't do.

To meet this complex situation there has been developed for each of the 60 possible letter combinations, four or five names which seem to meet all the requirements. They can be spelled and, what is more important, they can be dialed. Some appear on the opposite page, and there are others for each combination. The point about all of them is that they have met the various tests and that they can play their part in furnishing an ever-improving service to the customer.



The three-numeral codes of the NPA map as designed for the United States and Canada.

"What's Your Telephone Number?"

2-2—Academy	5-3—Jefferson
2-3—Adams	5-6—Locust
2-4—Chestnut	6-6—Mohawk
2-5—Alpine	6-8—Murdock
3-6—Emerson	7-4—Pilgrim
3-7—Drake	7-7—Prescott
3-8—Dudley	8-2—Talbot
4-2—Garfield	8-6—Townsend
4-3—Hemlock	9-3—Webster
9-8—Yukon	

Since the same names can be used in different numbering plan areas, telephone numbers in the different parts of the country are beginning to sound increasingly similar. Sentimentally this may not be too good, but telephonically, it is fine. Many a full-flavored local name must fall by the wayside as the changes are gradually made, and sometimes it is with considerable regret that a memory-laden name must be relegated to limbo. But, when in

so doing it becomes easier for anyone to talk with anyone else anywhere and at any time, it is not too inappropriate to echo the Bard and ask, "What's in a name?" Given an opportunity, some telephone people would be quick to reply "A lot more than meets the eye."

Over the past several years considerable progress has been made toward reaching the goal of full 2-5 numbering, a goal that is necessary for full nation-wide customer dialing. Today, about 20 million telephones, or nearly 40 percent, are on a 2-5 basis, with another 20 million planned by the end of 1957. These statistics portray the magnitude of the job; the complexities become apparent only by examining the past. While the future course of the basic numbering plan appears fairly well established at this time, no telephone people, and most particularly those who deal with these problems, would want to guarantee that there would be no further changes.

"... TO SPEED THE SPOKEN WORD TO DISTANT PLACES"

He found the means to speed the spoken word to distant places.

So reads the inscription on the bronze plaque honoring the telephone's inventor, Alexander Graham Bell, which was unveiled in the lobby of the A. T. & T. Building in New York on November 9, 1954. The bas-relief, by the eminent American sculptor Paul Manship, shows Mr. Bell as he was in 1875, seated at a small table and with the first telephone before him. The plaque was unveiled by Mr. Bell's two daughters,

Mrs. Gilbert Grosvenor and Mrs. David Fairchild, in the presence of others of his descendants and of several hundred Bell System employees.

In his brief address of greeting which opened the ceremonies, A. T. & T. President Cleo F. Craig said in part, "I shall not try to repeat to you the story of Mr. Bell's invention of the telephone. It is enough to say that by a masterpiece of sustained research, he succeeded where others had failed. He made experiment after experi-

Dr. Bell's two daughters, Mrs. Gilbert Grosvenor and Mrs. David Fairchild, stand directly beneath the figure of their famous father, with members of their families ranged on either side.



To Speed the Spoken Word

ment, and through keen perception and logical thought, he at last opened the door that before him had always been closed. His achievement changed the world. We who work to provide telephone service take a special pleasure in honoring Mr. Bell. But I think that in placing his likeness here in its place of honor, we shall also bring benefit to ourselves. It is good to be in the presence of a great man, and the feeling of a great man's presence is in this work of art."

After the curtains had been drawn, James Wheaton, of the Public Relations Department, read Mr. Bell's early prophecy of the future of the telephone into a model of the original telephone, then into a modern telephone. The Bell solar battery, one of Bell Telephone Laboratories' latest developments, supplied the power

for the modern telephone. Daryl Chapin, the electrical engineer on the three-man inventor team, held the solar battery to the sun and demonstrated that the battery transforms light from the sun directly into useful electrical energy.

Speaking "by the light of the sun," Walter Hampden, the distinguished actor, read John Milton Caldwell's tribute, "The Vision of a Man Named Bell." The Bell solar battery was connected to a tiny FM radio transmitter using transistors in place of vacuum tubes, and the words were picked up by a regular FM receiver connected to the loud speaker system.

[A painting of the Bell plaque is shown as our frontispiece (p. 208), and the last stanza of "The Vision of a Man Named Bell" is given on the back cover.]

Martin Myers (left), Bell's great grandson, holds a replica of the first telephone. At the right, Mrs. Fairchild and Mrs. Grosvenor stand beneath the plaque with President Cleo F. Craig.



A business office service representative brings better living to her customers and additional revenue to her company by promoting complete telephone service

OPPORTUNITIES UNLIMITED!

JACK CLARK

Business Office Engineer, O. & E. DEPARTMENT, A. T. & T. CO.

THE SCENE: A telephone company business office.

THE TIME: A bright crisp Winter's morning.

WE NOTICE an attractive girl in her early twenties talking on the telephone.

LET'S listen to what she's saying:

Well, Mrs. Edwards, I think you'll find that three telephones in a two-bedroom ranch house are certainly not too many—one in the kitchen, one in the living room, and one in your bedroom for those night calls. They'll save you lots of time and trouble and will cost only \$2.00 a month more than you're paying now. You'd more than triple the value of your service.

These remarks are part of a discussion between Betty Williams, business office service representative, and one of her customers. Service representatives in every telephone company business office, as Betty will tell you:

arrange to install a new telephone for you; make sure that the telephone service you have is just right for your needs; look after moving your telephone; and answer any questions about your bill or any other telephone matters.

Now they are taking on a new challenge—selling to residence and small business customers telephone service that is really complete.

Sales and servicing people, installers, repairmen, tellers, and lots of other telephone folks are also taking on this challenge. Each has a share in the undertaking, the service representatives' being based on the nearly 100,000,000 conversations that take place each year between Bell System service representatives and the public—100,000,000 opportunities to discuss really convenient telephone service.

BETTY has been a service representative for about two years now. Her training and experience have developed in her a desire to see that her customers get the most out of their telephone service. To be sure, that unhappy feature of the post-war period, shortage of equipment due to phenomenal growth in the telephone system, kind of held her back from always being able to provide the right kind of telephone service, when and where needed. She did her best to help her customers, but all the while she hated to say



As Betty points out, "Complete telephone service is just about the biggest convenience bargain you can get these days."

"Lots of times the plant man is able to spot sales opportunities that I can't see—and he's also able to back up my suggestions."





SCENE FROM THE MOTION PICTURE "FAMILY AFFAIR"

"Her very own telephone—a real thrill for any teen-ager—and practical too!"

"Morning meetings with our Supervisor give us a chance to swap experiences and to get the latest ideas on selling better telephone service."



"no" and just longed to be able to show them what really modern and convenient telephone service could do.

However, Betty is a lot happier now. The telephone company's tremendous construction program has really paid off, and shortages of telephone equipment are becoming a thing of the past in her town. Except for a few small areas, there are sufficient wires and cables to furnish individual lines to present customers as well as to take care of any new ones. There are better supplies of telephone instruments and other items too. This has been made possible by the Western Electric Company, manufacturing arm of the Bell System, which has not only produced the vast quantities of telephone material needed to overcome past shortages but is pushing ahead with the production of new and improved types of equipment to insure that everyone may benefit from the advantages of better telephone service.

Now Betty really feels she can do a job for her customers and her company. She knows that relatively few of her customers have had the opportunity to find out what complete telephone service means, that many have been conditioned to believe that telephones are always hard to get, and that, perhaps because of this, they think that one instrument in the hall is all there is to telephone service. But Betty says:

For real convenience you should have telephones throughout the house.

Why run when you can simply reach?

Costs too much?—Why, it's just about the biggest convenience bargain you can get these days.

People don't share their cars nor their washing machines, even though they cost a lot and are only used a part of the time, so why should they share their telephone line?

Betty knows that the telephone business will benefit from her efforts to give her customers better telephone service. For instance, two of the items that Betty sells are extensions and better grades of service. In addition to the relatively stable revenue that they bring in, the better telephone arrangements they represent make telephoning easier on both local and long distance calls, thus helping message revenues. They help answering as well, which improves completion of calls, speeds answers, and reduces equipment operating costs. Then too, customers soon find that conveniently located telephones are really indispensable. They want to keep those telephones through bad times as well as good. Betty wants her customers to think of complete telephone service the same way they think of other everyday necessities like electric power—you just can't imagine being without it.

NOW YOU CAN BET that all these wonderful opportunities to provide better telephone service just didn't materialize out of a clear blue sky and land right in Betty's lap one morning. No Sir! Betty is part of a whole new concept of "telephone merchandising"; the concept of seeking out the customer's needs and selling him the kind of telephone service that he should have—even in the face of some equipment shortages.

The Bell telephone companies' primary interest always has been to provide the best possible telephone service when and where wanted. However, not since the 'thirties have telephone companies been able to actively "sell" telephone service; and in those days there was plenty of equipment. Too much, in fact. Today, conditions are quite different. Outside plant facilities and other types of telephone



"With the modern trend to outdoor living, my customers find that outdoor bells and portable telephones really fit in with their activities."



Opportunities Unlimited!

equipment are adequate in most places, but there are few surpluses. In some locations and in some items shortages still exist, despite the best efforts to eliminate them.

The times are different, too. Nowadays, telephones are a powerful factor in everybody's lives, and the Bell telephone companies have an obligation to make sure that communications facilities keep pushing ahead with the general progress in our living. A forward-looking policy like this is the foundation of our future prosperity. It means that we cannot wait for every shortage to end, for every problem to be solved. We must get out now, find out what the customer really needs, anticipate his wants, tell him what we have and what it will do for him. In short, make and sell the best possible telephone service whenever and wherever we can.

PEOPLE APPRECIATE the achievements of the telephone companies, but they don't always realize the obstacles that have to be overcome. You don't need to tell Betty about that. She has got to make sure that spare cable facilities are available when she recommends a better grade of service. Delivery dates on colored sets vary from time to time. Other problems arise. But she still finds plenty of opportunities to recommend more and better telephone service to her customers, and she doesn't intend to pass them up.

Perhaps this a good place to find out how Betty feels about "selling" telephone service. Here's what she says:

I know we all think about "selling" and like to talk about the "sales" we've made, but selling telephones is not the same as selling motor cars or shoe laces. You see, when I "sell" an extension, the customer doesn't plank down his money and walk off with it under his arm. He agrees that

he needs that additional telephone and that he will pay us a small amount each month provided that we put it in for him and keep it working all the time. In order to make my "sales" stick, the things I recommend have to show my customer how wonderfully convenient telephone service can be. I like to feel that I've done him a really good turn.

Betty does well at this because she has received the necessary training and because the business office supervisor to whom she reports knows her business and is therefore able to give Betty the help and guidance she needs. Her supervisor's training included several days of handling customer calls, both incoming and outgoing, so that she was able herself to sell customers the better service that they needed. This actual experience has enormously increased her understanding of the sales job and has enabled her to provide Betty with really effective help. She does this by discussing with Betty difficulties that have been encountered, by drawing on her own sales experience for the best ways to handle various situations, and by short, simple sales discussions during regular morning meetings.

The training Betty has been given was designed to help her determine from her customers the kind and amount of telephone service that would best fit their requirements. She has learned not to be at all hesitant about using such questions as:

Mrs. Brown, is yours a two-story house? How many people are there in your home?

Are there many people using your telephone?

Where is your telephone located now?

She knows she doesn't have to ask them all. Sometimes she won't need to ask any, because in the course of talking with her

customers a lot of useful information turns up voluntarily.

She practiced picking out opportunities by making some actual sales calls from the classroom. She also learned the best way to present her recommendations to her customers. Her reaction?

Gee, this is fun. I never thought it would be so easy!

She found it easy because she knows and believes in the value of complete telephone service. All she is doing is passing on to her customers the facts about the comforts and conveniences they can so easily afford.

Also, in the training class Betty saw and

handled some of the various items that are available for "custom-tailoring" telephone service, such as:

Telephones in a variety of beautiful colors.

Portable telephones.

Additional listings in the telephone directory.

Telephones with a special volume control—for the hard of hearing.

Cords that stretch and won't tangle.

Extra bells for the patio or garage.

The opportunity to "play" with these and other items of equipment helps Betty to recognize quickly opportunities for their

"I sold an extra listing to one of these girls so that her friends could keep in touch with her while she's living with her aunt."





SCENE FROM THE MOTION PICTURE "FAMILY AFFAIR"

"I said to Mrs. Jordan, 'The office your husband works in has a telephone—so why shouldn't you have one in the kitchen you work in?' She says now she couldn't get along without it."

use and to talk with conviction to her customers about their usefulness. The more Betty knows about all-round telephone service for the home, the more helpful she is both to her customers and to the company. The training course also included films—one showing service representatives discussing and recommending telephone service plans to customers, and another that demonstrated how invaluable complete and convenient telephone service can be to people in the course of their normal day-to-day living.

What has this training and supervision done for Betty? How does she go about her daily job of bringing better telephone service to her customers? Let's go back to the business office and see how things are working out. Betty is talking to Mrs. Meyer, who is moving to a somewhat larger house than she has lived in up to

now. It is a two-story, three-bedroom house, of conventional design. Mrs. Meyer has called the Business Office to arrange for telephone service at her new address. Betty says:

Mrs. Meyer, I've got just the thing for you. It's a plan for telephone service designed for homes just like yours. It includes a private line with telephones on both floors especially located for your convenience. You'll be amazed at the amount of time and effort it'll save you.

Mrs. Meyer had been thinking in terms of just one telephone, and was a little dubious about having more. After all, she'd always gotten along with one, but Betty told her:

When you come to think of it, Mrs. Meyer, having a telephone in each area of your house—what you might call the working, living and sleeping areas—is almost a minimum for really good service. You see,



"People whose hearing is impaired really appreciate this telephone with the special volume control."

in the working area, your kitchen, we'd put a wall-type telephone with a cord that'll stretch but won't tangle; in your living room, a telephone on a conveniently located desk or table; and one in your bedroom—with a dial that lights up, which is just perfect for night time use.

"Well, the living room and the bedroom ones might appeal to my husband," replied Mrs. Meyer, "but I don't know that he'd go for the expense of one in the kitchen."

Why, Mrs. Meyer—an extension telephone is not expensive, only \$1.00 a month. If you have it installed at the same time as the main set, there's no extra installation

charge. Besides, you'd love the one in the kitchen. No worrying about dinner burning while you run to answer the phone, and it's so handy for shopping—I'm sure Mr. Meyer wouldn't mind.*

Mrs. Meyer thought it sounded attractive, but she didn't know whether she should talk to her husband or not. Betty added:

You know, the whole plan is very inexpensive—only \$3.25 a month more than you now pay for your party line . . . plus a single charge of \$5.50 to install it now. This save you money, because extension telephones ordinarily cost \$3.00 each to install.

That seemed reasonable enough to Mrs. Meyer and so she decided to try the plan that Betty recommended. It worked out fine, too, as she told Betty some time later:

"I'm so pleased with our telephone service. I had no idea how wonderful it can be to have the telephones right where they're handy. No more running up and down stairs for me—and my husband is delighted to be rid of our party line."

Betty has become an expert at diagnosing the telephone needs of her customers. It gives her a lot of satisfaction, too, to help make people's living easier and more comfortable. Take the other day, for instance. She was talking to Mrs. Gregory, who mentioned that her hearing aid didn't help her when she was talking on the telephone. Betty said:

Why, Mrs. Gregory, we have just the thing for you. It's a telephone with a special button to raise or lower the volume that helps most people with hearing difficulties to hear much better.

Another time, a mother with a new baby called and said: "You'll just have to do

* A new practice recently introduced in Betty's Company.

Opportunities Unlimited!

something about our telephone. The bell is always waking the baby up and he's getting so cranky. We have the phone in our bedroom and you'll just have to take it out, or cut off the bell or something. I'm just at my wits end!"

Betty was ready for that one too:

Why, that's a shame; but don't worry, we can fix it up. We could very easily disconnect the bell in that telephone and put one of our new wall telephones in your kitchen. With a new baby, you must spend a lot of time in the kitchen and this way you could do your telephoning without fear of disturbing him—and you wouldn't have to do without the convenience and protection of your bedroom telephone either.

Another problem solved, another customer made happier by Betty's understanding of complete telephone service.

Some of Betty's customers live in small apartments. Most of them don't ordinarily think that extension telephones are necessary, until Betty explains:

Often the distance from the kitchen to the living room or bedroom is as great in an apartment as in a small house. Getting out of bed or out of a nice comfy easy chair to answer the telephone is always bothersome. Telephone service in an apartment

should be designed for convenience, just as the apartment itself is.

Occasionally, Betty gets a disconnect request from one of her customers who feels that the telephone is an unnecessary expense. This worries Betty. As she points out:

Lack of a telephone can cause many problems. There is nothing like the reassurance of a telephone close at hand when you're awakened in the middle of the night by a strange noise, or when you need a doctor or suspect a fire. Keeping in touch with friends is much more difficult without a telephone, and if you're looking for a job, why it's a must. To me, being without a telephone is like being without electric lights.

YOU CAN SEE that Betty has to be a very versatile gal. A great deal of time and thought goes into the training and supervision she receives—and rightly so, for this is really big business. Recent results show that sales are being made by service representatives in the business offices to the tune of \$25,500,000 annual revenue per year. Among the items that produce this healthy chunk of revenue: 700,000 extension telephones, 145,000 directory listings, 550,000 upgrades, to name only a few. And, as Betty points out—we're just getting started.

*"Let us spray"—with chemicals—may reduce brush on
rights-of-way to a point where it can be controlled
during routine inspections of the lines*

NEW CHEMICAL SPRAYS EASE RIGHT-OF-WAY CLEARANCE

STANLEY A. HAVILAND

OUTSIDE PLANT SECTION, O. & E. DEPARTMENT, A. T. & T. CO.

"VOICE PATHS" IS A figure of speech familiar to most telephone people. It is one way of referring to the telephone cable and open wire lines which span the countryside. But few of us realize that these paths remain open to speeding voices only because actual physical paths are maintained for them. These physical paths are known as rights-of-way, and are recognized most commonly as the cleared swath of a cross-country pole-line route occasionally seen striking off over a distant hillside. These are the main telephone routes extending over many miles to connect the country's major centers of population. Of even greater total mileage are the roadside rights-of-way tying together the various local exchanges.

Why is it necessary to keep these paths clear of brush? The answer is not far to seek. Trees and shrubs capable of growing to the height of open wire and cable on poles can cause trouble through contact and by falling limbs. And if there is trouble, lower-growing brush—wild grapevines, blackberry and raspberry canes, for example—block the path of the repair crews. Poison ivy and other noxious plants

lie in wait for the unwary. Boulders, gullies, chuckholes and other booby traps are screened by dense brush and make progress along the right-of-way a risky business for man or truck. The problem is common to all the companies of the Bell System. Were nothing done to keep the "way" clear, the conditions described would exist on some 350,000 miles of pole line throughout the country.

Of course, something has always been done. Ever since the first line was built beyond city limits, crews of workmen have at intervals been going over the routes with axes, brush-hooks, and saws, cutting the brush and piling and burning it. In recent years, the people responsible for right-of-way maintenance have experimented with mechanization of the job. Bulldozers and steel-toothed scarifiers have been seen pushing over scrub growth, yanking it out by the roots and shoving it over to the side of the right-of-way. In some cases, this was followed by disc harrowing to chop up and cover the remaining litter. There is even a tank-like device which rolls up and down the line and literally beats the brush to pieces by means



of a series of slashing flails, in a manner similar to that used by the British to explode enemy land mines in World War II.

But even the best of these methods has its defects. There was a time when idle farm labor could be used during the off-season for low-cost manual clearing of right-of-way. With the increasing use of power tools on farms, this labor pool has dried up and labor costs have mounted as a result. The methods employing heavy power equipment, while spectacular and capable of doing a good initial job of clearance, churn up the soil. This is undesirable, since one objective of good maintenance practice is to develop and preserve a ground cover of grasses, low growing shrubs, and other vegetation as a means of preventing soil erosion. Elsewhere, these methods had the effect of creating a finely mulched seed bed, ideal for encouraging new brush to start.

Cutting brush produces no permanent effect in most cases. The plants immediately try to recover the balance between

the portion below ground and that above. Cut a single stem, a red maple sapling, for example. Next year you will have maybe three smaller ones. Cut these and the following season you find six or seven more starting. Each year the size diminishes but the number increases. In the end you face a bushy obstacle more formidable to passage along the right-of-way than the original tree. The same is true of many species.

BRUSH THAT THRIVES under conditions along the right-of-way is tough. Some species of growth found there will continue to grow if even a small bit of live root is left in the ground. While we do not as yet have a sure method for handling these more persistent ones, the appearance on the market some years ago of chemical weed killers has pointed to a way of controlling most of the types of growth found along our lines. These chemicals had the ability to kill not only the growth above ground but also, with most plants, to kill the roots.

The exact manner in which these mate-

rials cause the death of a plant is not yet known. Although studies have been under way for some time, the problem remains a complex one, similar to others in nature which are still unsolved after many years of research. For example, chemists have worked intensively for over 100 years trying to find out how a plant makes sugar, but only now are they beginning to understand the process. Tests have shown, however, that the brush-killing chemicals do enter the plants and get into the channels through which fluids move up and down within them. Once within the plant, it appears that certain of the chemicals may have some upsetting action on the plant's food processes. Chemical changes observed in the elements which make up the plant tissues and the occasional appearance of abnormal growth effects seem to point in this direction.

The development of the chemicals was by stages, a process which is still going on, by the way. Among the first found was a chemical for killing poison ivy. This turned out to be a general killer, and would kill almost any plant it was sprayed on. Another chemical was useful on lawns and in agriculture to kill broad-leaf weeds without harming grasses or grain crops. A close relative of the latter was discovered which would kill various types of briars.

When used for their intended purpose, these chemicals were applied in comparatively dilute form. Later it was observed that, when administered in stronger doses, they had the power to kill the woodier forms of plant life—trees, shrubs, vines and the like—still without having a permanently harmful effect on the growth of grasses.

In the use of these chemicals on telephone rights-of-way seemed to lie the answer to the problem of dealing with the

brush nuisance economically yet without any of the shortcomings common to previous methods. If we could spray the right-of-way at a cost comparable with cutting, and each time we sprayed we killed something, we might look forward to the time when we would have no more clearance problem. The right-of-way would be all grass and would maintain itself. We know now that this is practically an impossibility—there will be reinvasion of brush from wind-blown seeds and other sources. But even if we never reached this ideal situation, the prospect was sufficiently encouraging to warrant a start.

A FURTHER INCENTIVE to outright elimination of scrubby growth by chemicals, particularly on roadside right-of-way, is provided by the promise of vastly improved scenic and utility values in rural areas. Roadside brush is condemned by farm extension services as causing unsightly fence rows, ditch banks, and roadsides, and as an accident hazard through its obstruction of vision at farm lanes and crossroads. Clear roadside areas also mean more productive acres for the farmer by permitting him to plant closer to the lines. Highway forestry supervisors agree that the safety, convenience, and pleasure of motorists are benefited by brush-free roadsides, and they encourage the judicious use of chemicals for this purpose. Thus, in improving our own housekeeping methods, we are also assisting farmers, highway commissions, and park authorities in their work.

It must be admitted that trials proved the first chemicals, as used in 1946, almost worthless as far as their effectiveness in killing off brush was concerned. Early users, overrating the potency of the chemicals and underrating the importance of thorough application, at first applied the



*The revealing effect of one spray application
along a telephone right-of-way in Tennessee.*



August 1947



September 1953

Reduction of brush along the Burlington-Kansas City route through spraying.

materials sparingly and in dilute form to the leaves of the plants only. The green of the foliage would begin to fade as a result of the chemical activity. Eventually the leaves would drop off, and a successful outcome seemed to be promised. But a revisit the following spring would show nearly everything coming along flourishingly. Only the less populous susceptible species had been killed, and the best that could be found in the tougher dominant varieties was that the tips of the branches had been killed back a few inches.

What was wrong? If treatment were continued in this fashion, it might be possible eventually to worry the plants to death, but this would be too expensive. That some plants were killed outright was proof that the chemicals were not hopeless. The odd thing was that there were instances where only a tip kill was produced on one specimen, whereas alongside was an identical plant dead to the ground line.

There followed a scramble among manufacturers, researchers, and users to find the solution. First, the strength of the chemicals as supplied was stepped up and stronger spray solutions were applied. This

had the disastrous effect of stripping the leaves off the plants before sufficient chemical could enter their systems to produce results. As soon as the plants could grow new leaves, they were as good as ever.

Then it was discovered that certain chemicals affected one group of plants more than others, and so combinations of chemicals were put together so that they might complement each other with their special properties. This helped; a wider variety of plants was being seriously affected by the foliage spray, but the results were still erratic.

NATURE CANNOT BE HURRIED. Sometimes the full effects of spraying are not apparent until the plants have passed through the first or even the second growing season following the treatment. So it takes that much time to find out that everything is not as it should be before something else can be tried. It is no wonder, then, that, with the passage of time being measured in seasons and money being spent with no real results to show for it, serious doubts began to arise about this new method of clearing right-of-way.

New Chemical Sprays Ease Right-of-Way Clearance

But gradually the outlook began to improve. Reports began coming in of good rates of kill with chemical applied in water as foliage treatments, much in the manner of earlier sprays. Evidence was also at hand to show that resistant plants could be killed at any time of the year by applying stronger solutions of the chemicals in oil to just the stems or trunks at the ground line and to any portions of the roots appearing above ground. From this came the idea that, with a given strength of spray solution, successful treatment depended almost entirely on the thoroughness of applying the spray.

Investigation of reports of successful foliage applications during the growing season showed that, contrary to the original idea that plants could be killed simply by spraying the leaves, the only way to get more than a top kill was to spray the whole plant. This explained those baffling cases of identical plants standing side by side, one dead, the other hardly touched. The dead one had got "the works." Its leaves, twigs, stems and the parent stump had been doused thoroughly. The live one had got only a modest wave of the spray nozzle.

Discovery of what was required to do a

generally effective foliage spraying job helped to revive the confidence of the supporters of chemical control of brush, but it did not provide the whole answer. There is hardly a stand of brush anywhere that does not contain some stubborn species. Willows, birches, black gum, sycamore and alder, for example, are relatively easy to control. But they are rarely found on right-of-way except in the company of one or more of such species as red maple, ash, basswood, hickory and some oaks. These are among the difficult types, particularly if sprouting from old stumps left from the original clearing of the right-of-way.

FROM THIS SITUATION gradually evolved the two-stage treatment now coming into use. The density of brush on a right-of-way that has been cut over many times makes it impracticable to expect that every single sprout will be sprayed thoroughly the first time over. Taller growing brush shields the lower growth. To hit every stem would mean that the men doing the spraying would have to force the tall brush aside to reach the plants below it. Consequently, the first spray is looked upon simply as an opening-up operation in which the objec-

A spray rig of 150 gallon capacity in operation in Florida.



tive is to clear out the easier-to-kill species and possibly kill to the ground line or at least retard the growth of the others. With the area partially cleared, it is then possible in a follow-up treatment some time later on to give individual attention to the survivors.

The first spray is usually a general over-all spray with the chemical applied in water. The spray solution is carried in large tanks mounted on trucks capable of traveling over rough right-of-way. Pumps force the solution through hoses to men on the ground who direct the spray onto the brush by means of nozzles similar to those used in spraying orchards. An effort is made to wet everything having tall growing habits and all lower brush that would

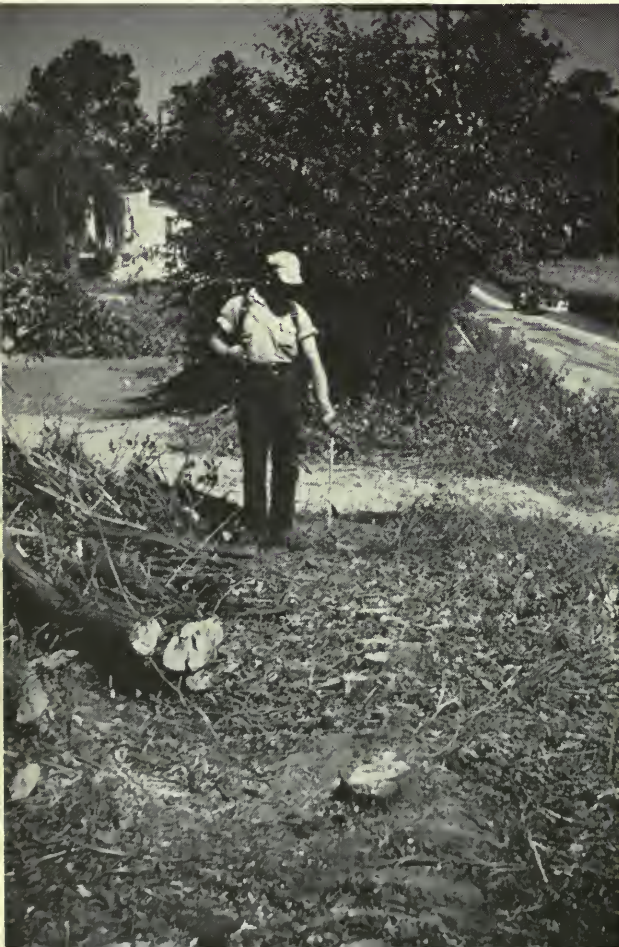
impede progress on foot along the route. Low-growing plants that do not form an impassable tangle are spared wherever possible for their value in preventing the re-establishment of unwanted types.

A successful treatment of this sort will remove up to sixty five percent of the unwanted brush from the right-of-way. Since the chemicals seem to persist in the plant for a considerable time, patience must be exercised in assaying the initial results. Scrub oak sprayed in June has been observed to put on leaves the following spring, only to have them turn brown and the plant apparently die later that summer. A second inspection the next spring would be necessary before deciding whether further treatment was required.

With good results on the first time over, the follow-up treatment, designed to get the plants that either were missed or had survived the first spray, can be directed at the individual clumps. For this work the chemical is applied in higher strength at the bases of the plants. It can be done at any time of the year, since in this treatment the chemical enters the plant through the bark and roots, and leaves are not necessary for the purpose. Because of the smaller volume of spray solution required for a given area, this work can be done using knapsack tanks carried by the men, although truck-mounted equipment is also used.

Where the brush growth is beyond reasonable spraying height, or where spraying standing brush would leave an unsightly strip along the roadside, the practice of cutting the brush and spraying the remaining stumps and stubble is followed. This treatment is similar to the basal spray and is effective in preventing the otherwise almost certain sprouting from the portion left in the ground. It is especially suited

This spray will keep these Pennsylvania osage orange stumps from sprouting anew.



New Chemical Sprays Ease Right-of-Way Clearance

for handling spiny growth like the osage orange or mock orange which was commonly planted years ago as fencing in rural areas. If killed while standing, this tree continues to present a thorny problem for years to come.

Some right-of-way is so inaccessible to vehicles or afoot that the chore of moving the chemicals and equipment to the spraying site becomes a task in itself. Costs may double or triple for the usual methods of treatment. In these situations some success has been had by spraying by helicopter. The lifting ability of such craft is limited, so that only comparatively small volumes of high-strength chemical are handled on each flight. This method is useful in keeping down the height of the brush, but a high rate of kill except on the most susceptible species does not appear likely. Because of the danger of drift of a spray stream applied at a height above the line, its use is confined to locations where the spray would not do serious damage if it should happen to be blown by the wind beyond the limits of the right-of-way.

The spraying is being done mostly under contract by line service companies experienced in right-of-way clearance work, and costs have shown a downward trend over the last three or four years. It is likely that this year will be the last year to see cutting done on any telephone right-of-way suitable for spraying. Even this will be done only because it is necessary in preparing the area for chemical treatment.

Considering that the annual bill for right-of-way clearance for the Bell System runs into millions of dollars, even a modest reduction in the total is worth going after. At present, a conservative estimate of future maintenance expense would place the annual saving at about fifty percent. Manufacturers of the chemicals are constantly at work improving their products and developing new ones. Field experience is showing the way to better methods of application. It is not beyond the realm of possibility that within the next few years, brush on our rights-of-way will be reduced to a point where it can be controlled simply as a part of the routine inspection of the lines.

Experimental spraying by helicopter on a mountainous right-of-way in California.



A non-lawyer who became General Patent Attorney and an authority on electricity, electrical patents, and patent law contributed much to early telephone development

THOMAS D. LOCKWOOD: AN EARLY BUILDER

RALPH E. MOONEY

Historical Librarian, A. T. & T. CO.

THOMAS DIXON LOCKWOOD is not often talked about today. If he is mentioned, it is usually as the man who once held the position of General Patent Attorney without being a law graduate. That in itself reveals much about him. By sheer application he made himself an authority on electricity, electrical patents, and patent law. He earned his title—and earned it well.

Dickens might have done the beginning of his life story, with Horatio Alger to take care of the American chapters. He was born in Birmingham, England, in December, 1848—less than two years after Alexander Graham Bell was born in Edinburgh. He began work at the age of eleven, washing emery at the Birmingham Plate Glass Works. He moved from this beginner's job to a Boulton and Watt machine shop, where he worked until 1865, when his parents brought him across the Atlantic. Like Bell, he began his American career in Canada.

At Port Hope, Ontario, he learned telegraph

raphy and became an operator. But the company he worked for was consolidated with another, and his job vanished. So he crossed the border and, while working in a paper mill in Massachusetts, took out his first papers for naturalization.

He roamed a little, but was never idle. Four years later, while working in one of William C. Depauw's glass factories, at New Albany, Indiana, he contributed an article on the manufacture of plate glass to the *Scientific American*. This achievement, when he had scarcely turned twenty-one without benefit of formal schooling, is another proof of his passion for and progress in self-education. The British machinist's helper was on his way up.

Back in telegraph work in 1872, he served for a time as chief signal operator at Morristown, N. J., for the Delaware & Lackawanna Railroad; then moved to New York, where he worked for the Gold & Stock and American District telegraph companies.



Thomas D. Lockwood: at about the time of his retirement in 1919, and in the early '70's. The device on the table at the right is a telegraph relay.

His connection with the American District company (about 1876) was a fortunate one. That company operated local telegraph and burglar alarm services out of small district offices that were found to be readily adaptable to telephone service when it came time to introduce Bell's invention—which was patented in 1876, you will remember—for commercial use. In New York and quite a few other cities, a number of early telephone exchanges started out by using the wires and office facilities of A.D.T. companies. Telegraph and telephone lines were then much alike, so that it was easy to connect a telephone in place of the A.D.T. instrument at the subscriber's premises, and not very difficult to complete calls through a primitive switchboard at the A.D.T. office.

In New York City, by the end of 1879, several telephone exchanges were operating separately. They were interconnected

later, of course, but at that time one belonged to a Western Union Telegraph subsidiary, one was strictly Bell, and two others were under Bell license. Early that year, when A.D.T. was considering taking out a Bell license, Theodore N. Vail, then general manager of the National Bell Telephone Company in Boston, went on a still hunt for likely telephone talent. He recruited Henry W. Pope, general superintendent of the A.D.T. Company, first of all—and Pope, in the years that followed, had much to do with the development of the metropolitan telephone system. Pope also recommended Lockwood to Vail.

Lockwood knew nothing about this. While he was on duty in the A.D.T. office at 699 Broadway near one midnight of July, 1879, he saw a man stroll into the public space outside the office railing. No, said this stranger, he did not want to hire a messenger or send a telegram. He seated

himself as if waiting for someone. Lockwood's assignment that night was to transfer all the burglar alarm equipment from one side of the office to another. Possibly this was to make room for telephone apparatus—although Lockwood does not say so in his account of the occurrence. Lockwood worked on, taking note from time to time that the stranger still was sitting in the outer office. In the small hours, Lockwood concluded the man probably was a visitor to New York who had been unable to find a hotel room and so had decided to pass the night in the A.D.T. office because it was one of the few places open.

When morning came and the transferred alarms, one after another, recorded a signal which indicated that the property they protected had been opened for business and that all was well, Vail spoke for the first time. He asked Lockwood if the lines were working satisfactorily and, when told they were, departed without identifying himself. But within a few days, Lockwood received a letter from Vail offering him a job with the National Bell Telephone Company, in Boston. He did not identify Vail with his all-night visitor until he called at the Boston office in answer to the letter.

VAIL TOLD HIM, with a chuckle, that he had felt that he had to stay to see if the lines worked after they were moved, and that when they did, he knew all he needed to know about Lockwood. The incident reveals something about both men and much about the Bell System in its second year of operation. That the general manager of the National Bell could and did give a whole night to selection of one new employee says a great deal about the size of the business and the attitude of its chief executive.

In Boston, Lockwood was made an in-

spector to begin with. Inspectors were needed in those days to visit subscribers' premises once or twice a month to put solution in the wet batteries that went with each telephone, and otherwise to keep the equipment in working order. And, although the National Bell was the headquarters of whatever Bell System existed in 1879, it also was operating some telephones in Boston which Lockwood helped take care of.

Before long, he moved from the street into the shop that was the fore-runner of the Mechanical Department which in turn was the ancestor of present-day Bell Telephone Laboratories, Inc. And in 1881, a year after American Bell had succeeded the National Bell as headquarters company, he was put in charge of the Patent and Technical Information Department.

JUST HERE, it might be well to understand how a man who was not a lawyer could become a "patent attorney"—which title Lockwood achieved in 1908—and serve as such with one of the largest corporations in the country. This could not happen today to anyone not a law graduate, although anyone who meets the requirements of the Patent Office may still practice as a patent agent. Under the old rules, however, anyone who met such requirements could call himself a patent attorney. He could not represent clients in court, but was authorized to prepare patent applications and act as an agent of inventors in getting patents for them. So Lockwood earned this position while on the job, just as many a contemporary passed bar examinations by "reading" while working as a clerk in a law office.

THE Patent and Technical Information Department was established under a mem-



The Lockwood siblings long ago. The older and taller boy is Tom. His younger brother, Frank, also worked for the American Bell Telephone Company for many years.

orandum from Theodore N. Vail, General Manager, which directed that it was to "collect data respecting electrical patents, and make digests of same." It was also to "draw the attention" of the management to any special points noted about each patent, and was to call attention to the relationship between new patents and older ones, and cite references to confirm the point. The Department was also to draw specifications for patents on inventions of Bell men, and it had the further duty of examining trade journals and textbooks and collating them for convenient reference, especially as they bore upon the art of telephony.

In his work, Lockwood was directed to consult freely with Thomas A. Watson, William W. Jacques, and Emile Berliner, who then constituted practically the entire technical staff of the company. Watson was the young electrician who happened

to be assigned to assist Bell in making experimental telephone models, and whose ingenuity was largely responsible for the development of early commercial apparatus. Jacques was a former Johns Hopkins professor who at this time was in charge of testing of equipment as it came from the several factories then making our apparatus. Later, he worked for many years making special apparatus for the use of Bell System lawyers in the prolonged litigation over Bell's original patents. Emile Berliner was inventor of the "loose contact" transmitter, and did important work in the development of other transmitters.

Lockwood amplified and expanded the scope of that widely inclusive memorandum as time went on, producing memoranda of his own which added to his duties the establishment of a technical periodical library, and the more or less

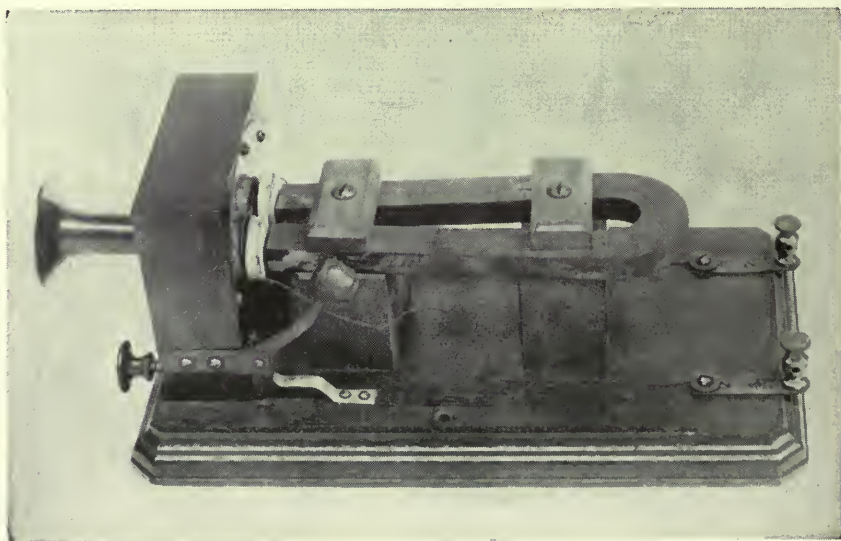
continuous production of a history of telephony, with a few other less imposing projects.

By steady work, aided only by a very small staff—usually two or three people—Lockwood did monumental work. Within a year or so he made himself a truly great authority in his chosen field of patents, patent law, and electricity, and was of immense assistance as an advisor to J. J. Storrow, Charles H. Swan, and other attorneys who represented the American Bell in the six hundred and more suits that were necessary during the '80's and '90's to protect the telephone patents. Indeed, his exhaustive memoranda upon telephone patents and his painstakingly accurate notes on phases of telephone history are often referred to by our lawyers today. One history of the growth of our business which he started, with several telephone engineers and executives as collaborators, was used even in its incomplete state (it never was

finished) for the historical orientation of public relations people when such work was undertaken on a departmental basis. It is reflected in some important policy statements in our Annual Reports from 1908 to 1915.

Angus Hibbard, who designed the Blue Bell trademark while a superintendent for A. T. & T. Co., says this of Lockwood in his autobiography: "Thomas D. Lockwood . . . had become the custodian of patents and expert advisor in matters relating to them. He was invaluable in this capacity."

Lockwood often appeared as a witness for the Bell companies before courts and commissions. Incidentally, whether from this experience or otherwise, he developed himself into a public speaker of marked ability. He was in demand for lectures at churches and clubs, and so may be considered a fore-runner of today's telephone lecture-demonstrators.



Interior of a box telephone of 1877—the first commercial telephone instrument. The little hammer at the left front is a "Watson's thumper," which served as a signal by striking on the diaphragm and sending a sharp knock through the diaphragm of the distant telephone.

Lockwood's prodigious memory and capacity for detail would have lifted him to even a higher place than he ultimately achieved in the Bell System had it not been for a curious blind spot in his personal outlook. This is most evident in a memorandum which he wrote in 1885, when Theodore N. Vail and E. T. Gilliland, head of the Mechanical Department, resigned from the American Bell Telephone Company (successor to the National Bell, in case you don't remember). He addressed it to John E. Hudson, who succeeded Vail as general manager of American Bell and who later became president of that company.

In this memorandum, Lockwood suggested himself to replace Gilliland in the Mechanical Department; and, in his proposals as to the future conduct of the department, he took a position that certainly was odd in a student of patents and inventions in a business that owed and was certain to owe so much to research and invention. He advocated that the Mechanical Department restrict itself to perfecting apparatus already at hand and to testing equipment delivered from the factories, leaving anything like pure research and new fields of invention to people outside the business.

He was not put in charge of the Mechanical Department, but his constant opposition to research and invention made him something of a storm center for many years. For an instance, in the late '90's a Bell System engineer-scientist named John Stone Stone followed Hutin, LeBlanc, Pupin and others in important work on what were then called "resonating circuits." Stone's researches were useful years later when carrier telephony was developed, but instrumentalities to carry out his findings were lacking when he reported

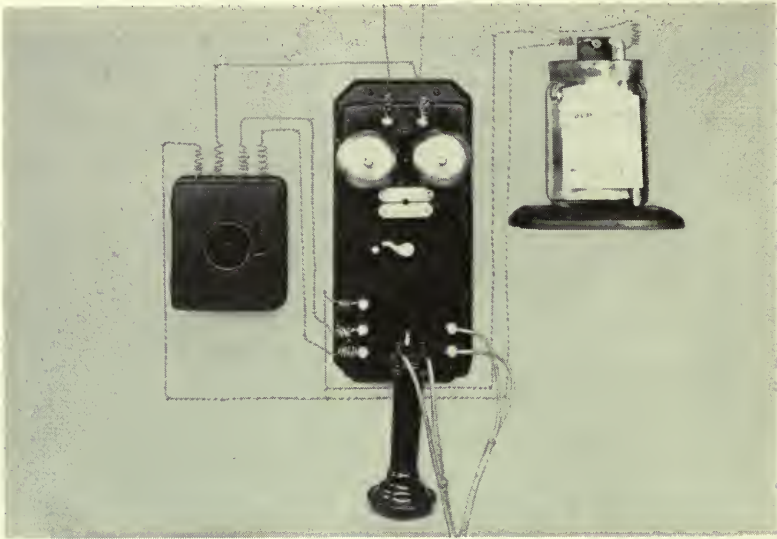


The first type of telephone bell, successor to the thumper. Thomas A. Watson's arrangement for ringing the called telephone continues in use today—in theory, at least.

them. Lockwood thought this sheer waste, and said so.

Thus in mid-career he nominated himself a Conservative in a business that had to be Progressive—putting himself in a position where he simply could not win. His attitude probably was a result of the lean years of his boyhood. He was careful of the company's money, careful of his own, suspicious of luxuries. Although well paid for his day, and a shrewd trader on the stock market, he never kept a horse or, what is less understandable, an automobile, although he lived until 1927 and was easily able to afford one.

In another of his lengthy memorandums, also written in 1885, he doubts that the experiment of using girls as operators will ever be considered an unqualified success. In a later one, he was convinced that some day it would be necessary to bring the manufacture of telephones back to Boston from Chicago. These ideas, long proved



This is the type of telephone that Lockwood tended on his first Bell job as inspector. The wet battery appears on a shelf; but not long afterward the first wall telephones were designed, with a cabinet for batteries under a sloping lid which came to be called a desk.

wrong, reflect his personality again. They both were intended to cut expenses, to cling to the known and not to accept anything new until its value was proved.

ONE DAY, Lockwood happened to be waiting to see John E. Hudson, by then president of American Bell Telephone Company. The anteroom at 95 Milk Street, Boston, was in charge of an office boy, Joseph A. Gately, who was reading. Lockwood asked what book it was, and, when he found it was *Paradise Lost*, quoted many passages to illustrate the modern marvels Milton had foreseen. Gately, writing of the incident later, could not recall why he happened to have that work in hand that day, and was certain he had never seen it thereafter. Nevertheless, because of it, Lockwood took an interest in him, and soon afterward insisted that Hudson—who could be formidable about such matters—release Gately to the patent department, where

Gately made quite a career in his own right.

The reason Lockwood gave for the move was also characteristic. How could a boy get anywhere in life if he sat through most of the business day reading instead of working?

Lockwood's own reading was done in his spare time, which he put to use in other ways. He made himself an authority on the Bible. He acted for years as treasurer of his church and superintendent of the Sunday School. He was one of the originators of the American Institute of Electrical Engineers, of which he was a charter member and an officer. He took up astronomy, which led to his acquiring a telescope for use at home.

At one time, he decided to read the *Encyclopedia Britannica* in its entirety and devoted half an hour a day for many years to this project.

Thomas D. Lockwood: An Early Builder

During his early days with National Bell, he contributed a "Notes & Queries" column to the publication called *The Operator*. This work he later had published in book form as *Electricity, Magnetism and the Electric Telegraph*. Another series of articles became *Practical Information for Telephonists*. Still later he produced a *Textbook of Electrical Measurements*.

Incidentally, Lockwood sent his book for telephonists to Mark Twain, with whom he had become acquainted. It elicited a reply in the humorist's customary style:

"I have read your book with great interest, particularly the first part, which details the history of electricity. I read the rest of the book just as I read a German book—for the sake of the solid enjoyment one gets out of almost understanding what he is reading, but falls just enough short of it to leave his mind in a state of enthusiastic confusion. You are so familiar with the technicalities that they seem simple and easy, but to an outsider they convey a darkness as impenetrable as our easy alphabet conveys to a Comanche. I read the whole book with pleasure, as I have already intimated, but I could not set up a telephone circuit now, nevertheless, which would pass inspection. I know I should get some of the ohms in the wrong place."

OLD-TIMERS WHO REMEMBER Lockwood are scarce now, but there was a time when nearly everyone had a favorite anecdote about him. For he certainly was a "character," as today's slang puts it. For years he budgeted his salary, carrying a sheaf of envelopes in his pocket, each to receive its allotment toward some purchase or proj-

ect. After he died, a considerable sum in currency was found tucked away in books in his library. In training his only son to face the world, he did not advance the money for his education, but loaned it to him at interest. And so on.

Angus Hibbard, mentioned earlier, tells a yarn that is more unusual. The other man in it is Frank A. Pickernell, then chief engineer of A. T. & T. Co. Hibbard writes:

"Lockwood was very fond of Pickernell and once when I called on him in Boston, he asked, 'How is Pick?' I said, 'Pickernell was all right yesterday. Let's call him up and talk with him.' To which Lockwood replied, 'No, I suggest that we have him call us up.' I asked what he meant and he said, 'You sit down and wait a minute and we will hear from him. He will call us from New York.'

"Less than two minutes later the telephone bell rang. Lockwood responded and said, 'Hello, Pick, here is Hibbard. I told him you would call us up. You talk to him.' I took the telephone and asked Pickernell why he had made the call and he said, 'I don't know. I just happened to think about Lockwood and called him.' Lockwood laughed and said, 'I would almost do that on a bet.' I can only say with Pickernell, 'I don't know,' but that is just what happened that day in Lockwood's office."

WHEN TOM LOCKWOOD RETIRED, he had spent the better part of half a century helping to make the telephone an instrument of national service. His work was never spectacular, but is firmly a part of the foundation on which our business rests. He retired in 1919, and died eight years later.

HEADQUARTERS SUMMARY

Sept. 15 to
Dec. 15, 1954

AGREEMENTS recently executed by the National Park Service with two of the Bell companies provide for the furnishing of telephone company services in Glacier National Park, Montana (Mountain States Company), and Big Bend National Park, Texas (Southwestern Company). The Government itself has heretofore provided the telephone service in these parks. Arrangements were made by the two companies to purchase those existing Government-owned communication facilities in the parks which would be useful in the furnishing of telephone company services. Plans are now under way for extensive additions and replacements, assuring high quality telephone service for the national park authorities, the concessionaires, and the visiting public in the coming seasons. A number of the other companies have studies under way looking towards the furnishing of telephone company services in other national parks.

A NUMBER of intercity communications facilities owned by electric power companies and railroads and used by them in their operations were knocked out by the recent hurricanes. In many of these cases the Bell telephone companies were called upon to provide substitute facilities and did so—providing a total of some 60 intercity circuits, ranging up to hundreds of miles in length, to replace the damaged privately owned links.

BELL SYSTEM EMPLOYEES elected to purchase about 50% more shares of A. T. & T. stock than were available under the Employees' Stock Plan offer which terminated last December 15. This constitutes the fifth stock offer to employees in the last seven years. Out of the 3,000,000 shares authorized by share owners in 1950 for issue under this Plan, about 1,550,000 were taken by employees in the first offer, on which installment payments are now being completed, leaving some 1,450,000 unsubscribed shares available for the recent second offer. However, the 657,650 Bell System employees eligible to purchase stock on the installment plan at \$20 below market price (at a maximum price to employees of \$150 and a minimum of \$100) applied for 2,208,000 shares. Obviously, this made it necessary somehow to cut total elections back to 1,450,000 shares; so, as provided for in the terms of offering, the available shares were allocated to employees who had elected to purchase by

changing the allowance of one share for each \$500 of annual base pay to one share for each \$810. Of course, as the terms of offering also stipulated, shares becoming available through cancellations may from time to time be allocated to employees whose elections to purchase had been cut back in the original allocation and who have not canceled any part of their election to purchase.

WHEN THE CALL of A. T. & T. Convertibles of 1963 and 1964 for redemption on December 15, 1954, was announced on September 15, about \$45 million par value of these bonds were outstanding in the hands of perhaps 40,000 owners. Since the bonds were issued in unregistered bearer form, the company had no real record of who these holders were. However, a number of special steps were taken to alert bondholders to the call, including the mailing of letters to the people to whom the bonds which were still outstanding had originally been delivered. As a result of these measures, all but \$3.1 million of the bonds were converted by the redemption date. This meant that most of the holders gained advantage of the conversion privilege attached to the bonds, which was worth about \$30 per \$100 bond when it terminated on the redemption date.

On December 15 the Company announced the further call of its Convertibles of 1961, of which about \$44,000,000 were then outstanding, for redemption at \$103 on March 1, 1955. Completion of this call will leave but one A. T. & T. Convertible issue outstanding, namely, the 3½s of 1965, of which about \$125,000,000 were left unconverted at the end of 1954.

During the year the Company established a new record for the amount of equity capital added in any one year, with nearly \$800 million derived through the conversions of bonds into stock. About \$213 million of this amount represented actual new capital. The result was a reduction in the debt ratio of the Bell System from 41.25% at the end of 1953 to approximately 37% at the end of 1954, representing the lowest year-end figure since 1945.

MORE THAN a hundred Independent telephone companies were asked last November by the United States Independent Telephone Association to study, jointly with the Bell companies, certain of their toll line operations involving some 650 circuit groups. The objec-

Headquarters Summary

tive of this study is to determine the appropriateness of present toll line settlements with the Bell companies for handling interchanged business. Study procedures were worked out jointly by Bell and Independent representatives, and the Bell companies are actively assisting the Independents in completing these studies. Completion is expected by some time in the Spring of 1955. Completed records will provide a valuable basis of facts for appraisal of present toll line settlements—a matter of equal importance to both Bell and Independent companies.

BY THE END of 1954 the Bell System television network had reached a total of 68,500 channel miles, 20,000 channel miles of radio relay and coaxial cable facilities having been added during the year. At that time more than 355 television broadcasting stations in more than 230 cities were linked by this intercity network, a gain of about 100 stations and 75 cities. A number of newly constructed branch lines extending from the major routes made possible much of this growth.

On November 1, the latest type of coaxial, called L-3, was placed in service between Miami and West Palm Beach, Florida, to provide television network service. Because of its greater band-width, the system makes it possible for a pair of tubes to carry two television programs and 600 telephone conversations simultaneously. During 1954, the major television network routes were also equipped to handle the transmission of programs in color—in all, some 47,000 channel miles. At the close of the year, nearly 140 stations in about 100 cities could receive the latest type of television picture.

PLANS ARE BEING MADE by Long Lines for the construction of an over-the-horizon radio transmission system between Florida and Cuba. This will be the first use of over-the-horizon radio transmission in the broad band widths required for multi-telephone circuits and television. Research by Bell Laboratories indicates that transmission for distances up to 150 miles without intermediate amplification is feasible in the frequency range of about 500 to 1,000 megacycles and for band widths required for broad band telephone and TV transmission. The proposed system would make use of high-power transmitters and large antennas to force signals between Southern Florida and the northern coast of Cuba. All facilities in the submarine cables which provide service with

Cuba are now in use. The proposed radio system would furnish many additional telephone circuits and provide diversification of facilities. It would have the further advantage of permitting experimentation with television transmission, looking toward the establishment of international TV broadcast service over this route.

SWITCHING SYSTEMS which will permit automatic alternative routing of long distance calls and enable them to be dialed to their destination were installed by the Long Lines Department at Charlotte, N. C., Denver, and White Plains, N. Y., on November 21. An unusually extensive program of open houses was held in connection with the opening of the switching center in the new building at White Plains, which serves as the headquarters of the Long Lines Eastern Area. Three "family nights," two occasions to welcome regional civic leaders, an open house for Associated Company employees, and two for shareowners of A. T. & T. Co. common stock who reside in the vicinity, were held.

A NEW transistor triode that, even in experimental form, has operated at higher frequencies than any previous design—well into the range used by FM radios and television—has recently been developed at Bell Laboratories. The new device, called an "intrinsic barrier" transistor, has already operated at 440 million cycles, and frequencies as high as 3,000 million cycles are theoretically possible.

MUCH OF Bell System and military equipment must operate efficiently under extreme conditions of temperature, moisture, and physical shock. Bell Laboratories' chemists and engineers have found the new liquid thermosetting plastic resins to be the answer to many difficult casting and potting problems, where complex electronic equipment must be encased to withstand rugged usage.

IN both sales of stock items and repair of telephone equipment, 1954 was a record year for the Western Electric Company's distributing houses. Stock volume—or sales from stock of both new and reconditioned items—was 12% greater than in 1953, and the value of material repaired was up 15% over the previous year. In all, Western's Houses delivered 19,700,000 stock items to Bell System customers during the year.

Who's Who & What's What

(Continued from page 207)

AUTHOR IN 1951 of a series of Bell System Practices describing the methods of application of various chemicals for brush control in right-of-way maintenance, STANLEY A. HAVILAND had spent the years since 1947 in investigating the possibilities of adapting those procedures for telephone company use. Starting with the New York Telephone Co. in 1924, he had gained experience in the plant and engineering departments by the time he transferred to the O. and E. Department in 1929. His assignments in outside plant construction and maintenance led naturally to his present interests.



Stanley A. Haviland in his garden, practicing what he preaches

LESSER KNOWN INDIVIDUALS among the "founding fathers" of this business are one of the particular interests of RALPH E. MOONEY, who since 1945 has been historical librarian of the A. T. & T. Company. His telephone career began in 1924, after some years of newspaper and trade journal experience, when he joined the Public Relations Department of the Southwestern Bell Telephone Company in St. Louis. Before transferring to New York in 1944

he had been editor of the *Southwestern Telephone News*, and in recent years he has been a frequent contributor to this MAGAZINE. His most recently published article was "The First Seventy-Five Years," in the issue for Spring 1951, and he contributed a book review, "Forbes: Telephone Pioneer," to the issue for Autumn 1953.

Historical Librarian Ralph E. Mooney reaching for the facts



DR. GEORGE ASHLEY CAMPBELL

NOT LONG AFTER Dr. George Ashley Campbell retired from the Bell Telephone Laboratories in 1936, the A. T. & T. Co. issued a volume containing his technical papers, in commemoration of his long and distinguished services as research engineer of the company and of his fundamental contributions to the development of telephone transmission. Just 17 years ago the BELL TELEPHONE QUARTERLY, in its issue for January 1938, was able to publish the first two chapters of that book. These were a *Foreword*, by Dr. Vannevar Bush, then Dean of Engineering of Massachusetts Institute of Technology, later President of the Carnegie Institution, and an A. T. & T. Director; and an *Introduction* by the late Dr. Edwin H. Colpitts, a former executive vice president of the Laboratories. These chapters were somewhat less technical than Campbell's own writings, and were published here as in the nature of an "appreciation."

Dr. Campbell died on November 10, 1954, and the Laboratories has put forth a memorial statement, from which we are able to quote only briefly:

"The passing of Dr. George Ashley Campbell . . . marks the close of an era that has seen the communication art grow from infancy to robust manhood. . . .

"Though Campbell's achievements are now best known by his personal mathematical contributions, he contributed to the advance of

telephony in another way that should not be forgotten. He it was who hired Frank B. Jewett and Edwin Colpitts, and others, whose ability and training fitted them for leadership in the application of scientific knowledge and methods to the practical problems of telephony.

"He was a gentle and retiring man, but to those who knew him best he was a lovable companion who sought not fame or high position, but understanding. His interest in the technical problems of telephony continued to the end of a long and active life. Out of his work came useful and readily available mathematical tools for those who followed him, but more importantly a spirit of inquiry that left its enduring imprint on the character of the Bell Telephone System as we know it today."

Of particular interest to telephone people will be a paragraph from a letter written after his father's death by Dr. Ashley S. Campbell, Dean of the College of Technology at the University of Maine:

"He was certainly a fortunate individual to associate with a company which had such an enlightened point of view towards pure research. He could have easily become frustrated had he joined some other organization. I think it is very much to the credit of the Telephone Company that they recognized his ability and allowed him the freedom of thought and action which they did."

PROMPT MAILING of quarterly dividend checks to 1,305,000 share owners is a "must" for A. T. & T. Treasury people. To expedite delivery, an extra step was added more than a year ago to the dividend preparation job, which involves sorting the checks into geographical zones for earlier mailing to distant points. But one difficulty is always present: Nearly 40,000 share owners change their addresses between quarterly payments and some fail to give notice of their new address. For last October's dividend, this resulted in over 1,300 checks being returned by the post office as undeliverable because the owners had left no forwarding addresses. About 1,000 checks were remailed to new addresses as a result of inquiries from owners, and tracers were then started on the remainder. In this work, Asso-

ciated Companies always render most helpful service through their records and local contacts. Sometimes owners are traced through banks or brokers they have used, sometimes through friends or relatives. By dint of such detective work, Treasury people are usually able to locate most of the remaining missing owners each quarter. When a check is undelivered in the previous quarter, of course the current dividend check is not mailed. It cannot be said how many owners are permanently missing, as some of the most stubborn cases are cleared up from time to time, but there are at present fewer than 180 domestic cases over two years old, representing ownership of under 650 shares, and about 80 foreign cases with some 475 shares.

The Blue Pencil



LINES TO A LINEMAN

*No word of pen or stroke of artist's hand,
No flowered phrase or oratory's boast,
Need tell the story of the world you've made.
'Tis writ upon the pages of the land
From north to south—from coast to coast.
Those poles you mount,
Those lengthened strands you string,
Are not just sturdy uprights in the sky
That march across the miles in proud parade.
You've made them into words that help and sing—
A doctor's call, good news, a lover's sigh.
Deep etched in time the record of your skill,
The work you've done, your willingness to do,
The fires and storms you've tackled unafraid.
Your signature is carved on every hill.
Yours, too, the creed—"The message must go
through."*

These words are brought to mind by the competent figure on our cover—although they were written for another occasion. From the pen of George Cecil, an officer of one of the agencies which handles A. T. & T. Co. advertising in national publications, this verse appeared in such an advertisement in the Autumn of 1953. So exactly does it express the feeling of Harry Sternberg's etching that we are happy to borrow it for our own purposes.

SEVERAL OF THE major components of this issue have overtones, or coincidental values—or whatever you choose to call items which catch the eye in relation to other items.

Last Autumn's hurricanes were bad news on a vast scale, as John Mitchell's article makes clear, and it is quite natural that there should be a good many references to the events in the press. One such, in the Newburyport, Mass., *Daily News*, had to do with some of the out-of-state telephone crews which came to the aid of their New England colleagues, and said, among other things, "Residents of Parsons Street say they want to re-name the street Virginia Avenue in honor of the telephone boys from Virginia who are working so hard to restore phone service in that area. The crew of five men from The Chesapeake and Potomac Telephone Co. has been working there since last Friday night and their cheerful 'you all' greetings each day

have made them great favorites in the neighborhood. Incidentally, two of them had lobster for the first time the other night, and thoroughly enjoyed the famous New England specialty."

Another, appearing in the Wilmington, Del., *News* after the third blow, had a word to say about outdoor public telephone booths, and then continued: "The other night, after the hurricane, motorists on a road in nearby Pennsylvania were passing through an area where the electric blackout was complete. Complete, that is, except for the portable lights of the linemen of the power and telephone companies. From place to place they were hard at work up their respective poles splicing their respective wires. Maybe there was a bit of good-natured rivalry between the men of the two outfits. What tickled the motorists was a particularly lonely little booth standing there in the darkness. But it wasn't dark inside. A single flickering candle within left no doubt—temporarily at least—as to which outfit was one up on the other."

And do you remember that in this place last Autumn we questioned the appropriateness of feminine names for such brutal things as hurricanes, and suggested, in place of "Carol" and "Edna," such terms as "Caesar" and "Eagle"? Well, out of Washington via the United Press came, last December, a dispatch which said in part: "The Weather Bureau will decide next month whether to stop using girls' names for hurricanes and start calling them something else—maybe Antelope, Bear and Coyote, or Attila, Bluebeard and Cain."

Still, we were speaking of coincidences.

STANLEY ERICSON'S CONTRIBUTION on telephone numbers rings a bell too. For in Chicago a seeing-eye dog was found whose only identification was a tag reading "E. Williams, 400 S. Cherry St., FA 8418," but no city name. Chicago has no South Cherry Street, so the Illinois Bell Telephone Company was asked to identify the telephone number. A quick search showed it was the Falls Church, Va., number of Miss Esther Williams, who had recently moved to Chicago. She was located at the Veterans' Administration Research Hospital,

where she is employed. After Tessa was returned to her, Miss Williams hurried to obtain a teletag listing her Chicago number.

WHICH LEADS—down grade, perhaps—to the yarn, allegedly factual, about the dog which growled, snarled, and generally went into a tailspin whenever the telephone rang in the residence where he lived. A veterinarian was called in who was somewhat of a canine psychiatrist. He found that this particular animal had had a broken leg, and while recuperating his bed was near the telephone. Even though the dog was not allowed up on the couch (and a psychiatrist without a couch is certainly at a disadvantage) he was able to diagnose the case perfectly. The dog associated the pain he had undergone with the ringing of the bell. Accordingly, a set of chimes (now standard telephone equipment) was substituted. The dog is now perfectly normal and well-adjusted.

WHILE CHRISTMAS is still fresh in the minds of us all, perhaps you would like to hear about the telephone man who made this happy holiday safe as well. For it was a telephone man who first put electric lights on a Christmas tree. Until he did so, wax candles glowed softly—and dangerously—among the dry, explosive needles.

Leavitt F. Morris, travel editor for *The Christian Science Monitor*, reports that as a small boy he crawled under his Christmas tree and upset a candle. It only singed his hair, but his father, Ralph E. Morris, who worked in the telephone office at Cambridge, Mass., promptly announced there would be no more such dangerous flame near a Christmas tree in his home. During the year that followed, Mr. Morris bought several dozen telephone switch-

board lamps, and put in many evenings soldering the tiny bulbs to a pair of wires and covering them with colored paper. His tree, at Christmas, brought gasps of admiration from those who saw it.

"Of course," Leavitt Morris writes of his father, who now lives in Laconia, N. H., "my Dad never realized then—and I'm not certain he has given it much thought since—that that lone tree with its improvised lamps has really never stopped glowing. Its tiny lamps shine on millions of trees each Christmas."

SO WE ARRIVE, by a circuitous route, at the matter of our cover etching and its creator, Harry Sternberg. A native New Yorker, he numbers among his accomplishments those of painter, graphic artist, muralist, industrial designer, lecturer, author—and, of course, etcher. He was a Guggenheim Fellow in 1936, and is represented in museums, galleries, and private collections from coast to coast. His is the fourth—and last—of the series of original etchings which have graced the covers of Volume XXXIII of this MAGAZINE; and, like those which have preceded it, a reproduction without printing is available to any telephone employee who will ask the editor for it. Actually, a *few* reproductions of the other three still remain, and, since they do nobody any good in storage, will be sent while they last to those who wish to round out a collection. Please specify the ones desired.

THERE IS one collection of the covers which is unique. For it consists not only of four original etchings but of the copper plates from which they were pulled—and the latter are, of course, the only ones in existence. They hang, framed, in an A. T. & T. office in New York. Guess whose?



They hang . . . in an office in New York





The Vision of a Man Named Bell

At the conclusion of the ceremonies in connection with the unveiling of the Alexander Graham Bell plaque in the lobby of the A.T.&T. building in New York last November (as recounted on an inside page), the distinguished actor Walter Hampden read to the gathering "The Vision of a Man Named Bell." This tribute was written by John Milton Caldwell in commemoration of the Seventy-Fifth Anniversary of the telephone, was first read by Mr. Hampden on the Telephone Hour of March 5, 1951, and was carried in full in this MAGAZINE for Spring 1951. The last stanza is given below.

*How does a man's dream grow?
It grows as a nation grows,
Eternally leaping the horizons,
calling others to follow —
And the others caught up in his vision —
the builders, the planners,
The lineman against the sky —
the girl at her switchboard —
The scientist charting the tides
of invisible sound —
The splicer sealing the joints of the cable —
All are the weavers of speech serving
the nation in peace and in war
Carrying the word — across the
silence of time and of space —
Along the gleaming wires —
all the words of love and birth and life —
Throughout all the land — to the
farthest village and town —
And beyond the dark seas — and the endless
horizons beyond the earth's curve —
This was the vision of a man
named Bell —
And we are the inheritors
of his dream!*

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*Bell Telephone
Magazine*

Volume XXXIV, 1955

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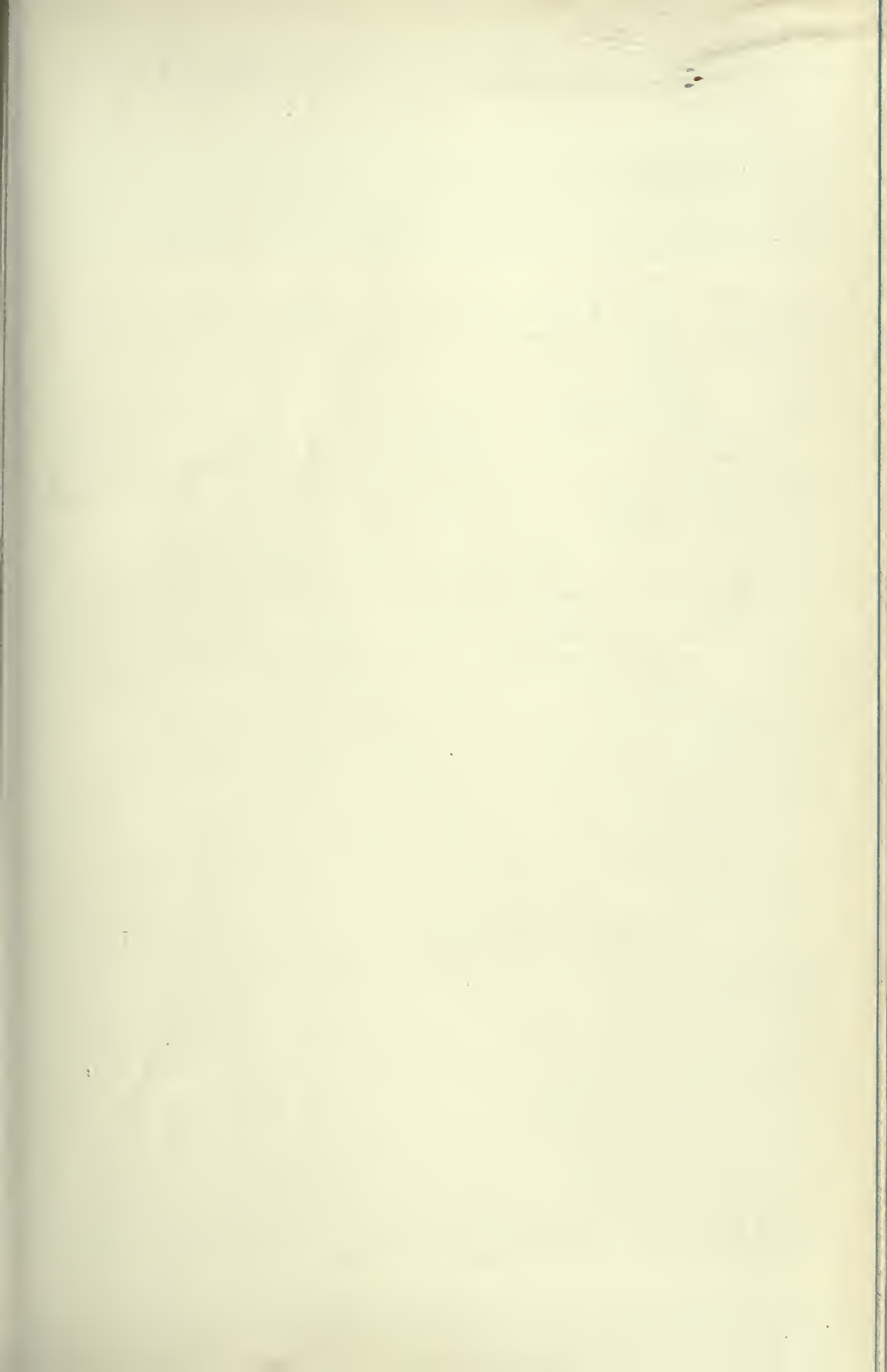
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Bell Telephone MAGAZINE

SPRING 1955



Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.



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JUDSON S. BRADLEY, *Editor*

SALVATORE J. TAIBBI, *Art Editor*

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CLEO F. CRAIG, *President*

S. WHITNEY LANDON, *Secretary*

JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

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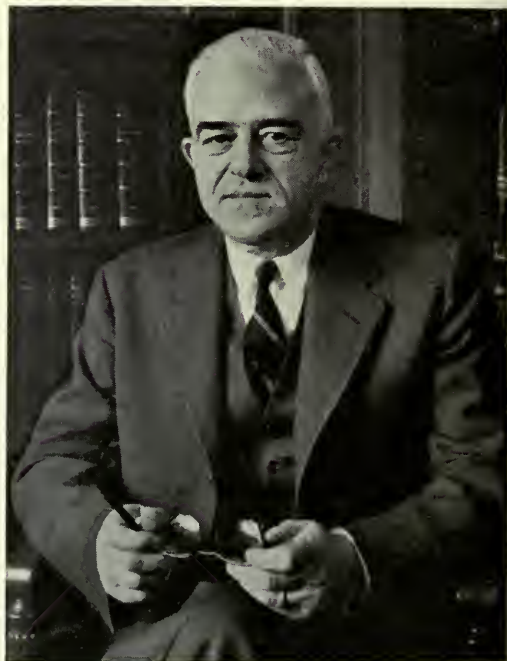


Bartlett T. Miller

AS NEWLY APPOINTED HEAD of A. T. & T.'s newly organized Merchandising Department, BARTLETT T. MILLER brings to our readers authentic word of what place that department, and, indeed, the whole merchandising activity, may be expected to hold in the Bell System scheme of things. Mr. Miller is no stranger to this MAGAZINE, however; for until as recently as last February 1 he had been in charge of the A. T. & T. Public Relations Department, and therefore responsible—nominally, at least—for its publication. Just a year ago he contributed to these pages his "Serving a Nation of Home Towns"; and, before that, "Telephone Communication in a New Era"

and "The International Telecommunications Conference of 1947." His present contribution is based on a talk he gave at the Operating Vice Presidents' Conference last February.

Beginning his Bell System experience with what is now the Mountain States Telephone and Telegraph Company in 1910, Mr. Miller moved 13 years later to the New England Telephone and Telegraph Company and service in various New England states. While general traffic supervisor in Boston, he was appointed Commercial Department division manager for Rhode Island, and then general commercial manager at the company's headquarters. He was elected Vice President in charge of



S. Whitney Landon



H. Randolph Maddox

Public Relations in 1944, and in 1945 became Vice President and General Manager of the New England Company. He moved to New York in 1946, when he became an assistant vice president in the O. & E. Department, and the following year he was elected Vice President in charge of Long Lines. He returned to the headquarters organization in 1949, and in 1950 assumed the Public Relations responsibility which he has just now relinquished.

AS SECRETARY of the A. T. & T. Co., S. WHITNEY LANDON is charged with many duties to the company's share owners. How broadly he regards those duties may be judged from the viewpoint he expounds in this issue. Three years with the Western Electric Company—1923-26—preceded an eight-year period as a practicing lawyer in New York City, and in 1934 Mr. Landon returned to the Bell System as an attorney in the Legal Department of A. T. & T. Co.

In 1937 he became General Attorney of the Long Lines Department, remaining there until 1951. In that year he transferred to the Secretary's Department at A. T. & T. as assistant vice president and assistant secretary, prior to his election as secretary in 1952. He was appointed Assistant to President at the same time.

TWENTY-SIX YEARS AFTER H. RANDOLPH MADDOX joined the Chesapeake and Potomac Telephone Company in Washington, in 1921, he became President of the Chesapeake and Potomac Telephone Companies—the four units which render telephone service in Maryland, the District of Columbia, Virginia, and West Virginia. Analysis of titles held discloses a good many beginning with the word "Commercial" and including such specifics as "Division," "Engineer," "Supervisor," "Sales," and a succession of "General" and "Manager" during the first 20 years. Then come the "V. P.s": with "Gen'l. Mgr.," with "Sec'y. & Treas.," with "Pub. Rels." It's a widely diversified list which leads to "Pres." Then, the first of last year, Mr. Maddox left Washington for New York and a new job as A. T. & T.'s Vice President in charge of Personnel Relations.

SINCE JULY OF 1952, JOHN W. COGSWELL has been a member of A. T. & T.'s Public

(Continued on page 67)

John W. Cogswell





People are interested in our services. This telephone display at an industrial and construction exhibit attracted 65,000 visitors.

*The new A. T. & T. Department will advise and assist
the Associated Companies on matters pertaining to
marketing of all Bell System services*

MERCHANDISING: WHAT IT MEANS FOR OUR BUSINESS

BARTLETT T. MILLER

Vice President, MERCHANDISING, A. T. & T. CO.

AS I REVIEW THE ACCOMPLISHMENTS of the Bell System Companies since the war, I never cease to be excited at how truly amazing they are.

We have raised seven and a half billion dollars.

We have manufactured and installed more than 500 billion conductor feet of cable.

We have installed between 50 and 60 million telephones, for a gain of 22 million.

We have employed and trained 1,200,000 people, for a gain of 200,000.

We have added 69,000 channel miles of television network.

We have cleared almost every order of all the tens of millions received since the end of the war.

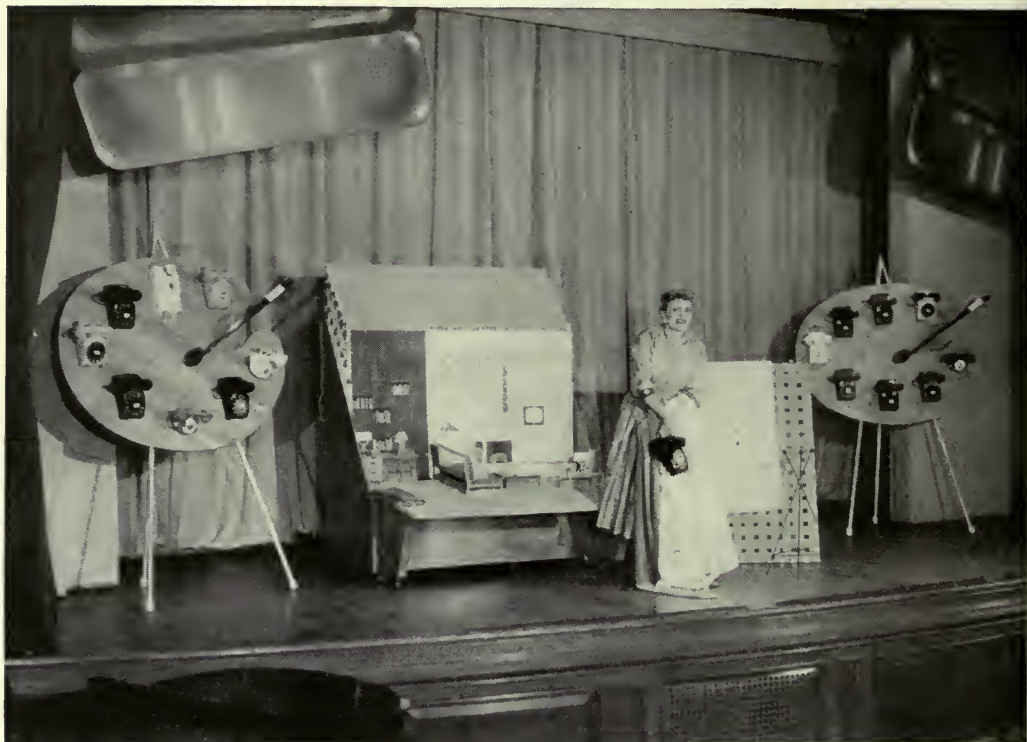
And with it all, we improved the service and—through the regulatory commissions—secured rate increases amounting to nearly a billion dollars. And today we are earning our dividend and building up the surplus

per share, notwithstanding the tremendous increase in shares. It is truly a remarkable performance.

The impossible couldn't have been repeated from year to year if we had at any time been content to rest on our oars; but it seems almost as if each year the problems were tackled with new vigor, new enthusiasm, new imagination.

But I think, in all justice, we would say that the physical or the mechanical or the technical progress in our business has perhaps outstripped the human or administrative side of the business.

As an example, we aren't yet entirely ready to give everybody the kind of service he wants, when and where he wants it; yet technically there is no block. Technically, we can dial across the country and the machine will find an individual number on the Pacific coast in 20 or 30 seconds. Technically, we can advance a television program thousands of miles for perfect reception at the distant end. Technically, we can accomplish great things with the transistor



The place of colored telephones in modern living is demonstrated to employees by a noted interior decorator.

and with silicon. So, technically, we can do a lot of things.

There have been and will continue to be, of course, a variety of administrative problems—such as raising rates to reasonable levels, raising new money, expanding our manufacturing capacity, earning a reasonable return; but we must recognize that there are others too—those which involve the customer and his service. While I don't feel that our failure to solve some of these customer problems has yet done material damage to our standing with the public, I'm quite sure that we cannot much longer continue as we now are without damage to us.

In addition, we might also find, if we took much more time to get on top of these problems, that we might be too late to

enjoy the fruits of our present economic boom. Some of us may still think we should go slowly and not get caught in the next depression as we did in the last. I can testify that those of us who went through the slump of the '30s did get a tremendous fright, but we are in a different era now. A new philosophy of economics as well as politics, plus the greater dependence on communications today, might to a degree cushion our decline—and certainly our problem will be no different from most others who must merchandise their product.

Reasons for Merchandising Department

I THINK THAT MAY HAVE BEEN in the back of Mr. Craig's mind when he decided to establish a Merchandising Department at



Employees see the same displays and get the same messages as the public—and earlier.

the policy level. I know that he feels that all of us perhaps need to lift our viewpoints somewhat, and I think he wanted this at the policy level because the activities which cut across this merchandising concept are found in practically every department.

They are found at the Laboratories and the Western Electric Company.

They are found in the Public Relations Department with advertising and public information.

They are found in the Accounting Department through our billing procedures.

They are found in the Financial Department in the need for capital to supply what the customer wants.

They are found in great measure in the Operating Departments—in Engineering, in Plant, in Traffic.

I think it could be said that Commercial has more nearly been on a merchandising basis for a good many years because it has had to meet the public on all these questions—and today is certainly active in selling. But they can't sell what we don't have, nor should they find themselves in the state where they sell only that which we have left.

We must reinforce our policy to provide facilities, equipment and service to meet the customers' wants and needs—perhaps to the point where we can create wants and needs rather than to be wholly on the basis of demand.

What the Duties Are

PERHAPS IT WOULD BE WELL to outline and interpret the duties and responsibilities of the Merchandising Department as defined

by Mr. Craig and as approved by the Board of Directors of the A. T. & T. Company.

The department is established to advise and assist the companies—not to direct the activities, but to advise and assist—to the end that the “customers’ desires and needs are anticipated and fully satisfied.” We can only interpret this to mean that we must work toward that as our objective—“that desires and needs are anticipated and fully satisfied.”

Now it is perfectly obvious that this can’t happen over night, because we have, of necessity, been engineering our plant for the last ten years with narrow margins both outside and inside, and it may take some time to intelligently work into the plant a sufficient amount of cable and central office equipment to anticipate and fully satisfy customers’ desires and needs. Because it will take time, it would seem that it is not now too early to start thinking about it and

planning it. There is much for us all to do to make our plans and our estimates in plant, facilities, men, and money to meet that objective.

The broad responsibilities are broken down into three categories: Market Research, Marketing Methods and Techniques, and Facilities and Instrumentalities.

Market Research

I THINK WE CAN BE of assistance in developing techniques in research to determine

Displays in public offices and building lobbies acquaint customers with what we can offer them to add to the value and usefulness of our services.



markets—markets for existing services and markets for new services. We think, too, that it would be helpful if we could get together information concerning existing customers' usage and habits.

What causes a customer progressively to increase his use of the service? Is it, in part, the location of the instrument? Is it freedom from interference? Is it wholly a question of income or a circle of friends? If we knew, it probably would be important in assisting those who now use their services less to make greater use of them—and the greater the use, the more indispensable the service becomes.

This may run afoul of some of our concepts with respect to calling rates in flat rate offices, but I believe if you will think the matter through you will agree that we ought to do all the things we know how to do, and some we may learn to do, in flat rate cities or message rate cities, to get people to depend on the telephone—to make it a habit. I think we might find—although I am not trying to anticipate the results of such laboratory work—that a comparatively heavy use of the service for local purposes almost invariably precedes a heavier use for long distance purposes. In other words, using a telephone is a habit, and the one best way to start to develop the habit is on the nearby local calls.

Then we want also to get information on customers' wants and needs in relation to markets. We are making headway in this direction through the many thousands of contacts which the Commercial people have, but I believe there is also room for some other approach that might more nearly represent depth interviews. The rates for new services depend a great deal upon the cost of the facilities, and manufacturing costs depend a great deal on volume, and if we could determine initially

the total market for such a facility—as, for instance, the hands-free telephone—and it developed to be a mass market, it might have some influence on the rates and charges. Market Research also anticipates some study as to the effectiveness of marketing, advertising, and sales activities.

Marketing Methods and Techniques

UNDER *Marketing Methods and Techniques* it is our hope that we may be able, through study of outside methods and perhaps the use of outside consultants, to initiate and develop some merchandising ideas and techniques. There are some concerns that believe that the display is the key to an aggressive sales activity. There are others who think price concessions are a boon to sales activities. Perhaps we can learn from those who have had to make their living in this field some things that would help us in our field—but we don't here propose to be radical or too experimental.

We would expect to advise and assist, if it were desirable or necessary, in developing coördinated plans for the promotion of all markets for services and facilities. Speaking generally, here it would seem that when confronted with a conversion, a dial cutover, you might very well consider doing a complete job of engineering, building, selling and converting—with the idea that a few pilot towns in each territory as examples, or objectives, or models would assist in setting objectives and estimates of future plans.

I would hesitate to say how long it might take to provide a sufficient amount of outside plant and central office equipment to eliminate all four-party service and to get a minimum development of one-party in the neighborhood of say 80 per cent, but it would certainly seem that each company



"Guess the Cost" of Long Distance calls is a popular feature at "open houses."

should have one or two places in which they have done a complete job to indicate what the possibilities are.

Of course, in this sort of planning the known developments in the Laboratories may be tempting, and it may be the inclination to postpone any thorough-going merchandising effort which would involve the building of plant, in anticipation of getting a cheaper plant at some later date; but I believe that that idea should be tempered with considerable prejudice in favor of the customer now. Our plant and facilities will always be improving through research and development, and the new things never come fast enough, so we shouldn't postpone giving customers today the best we know how today by waiting for the newest thing some time in the future.

The other item in *Marketing Methods and Techniques* involves assisting in developing coordinated plans for advertising, display, and other promotional activities associated with specific sales activities. I think there is no problem here if there is general agreement that specific sales activities—such as non-user canvasses, special regrade canvasses, special extension canvasses, etc.—are backed up with appropriate advertising, display, or other promotional activities. This merely suggests planning—planning in such a way that all of the known aids are centered on the particular activity in order to get the greatest value from the effort.

Facilities and Instrumentalities

UNDER *Facilities and Instrumentalities*, the

Merchandising: What It Means for Our Business

item of assisting in coördinating merchandising plans with engineering, construction, production, and sales programs is really intended to cover the more general activities, coming back perhaps to the thought of planning, so that all departments participate and contribute intelligently and in an orderly way.

In the enthusiasm to get going, confusion can be avoided only when we know in advance what is to be done and how it is going to be done. We may possibly be of some help in the question of estimates, particularly on the long-range basis. This might be especially true if we are successful in our research work in determining markets for existing and new services, and I think it is especially important involving new facilities where tooling up by Western Electric is necessary. That is, of itself, a

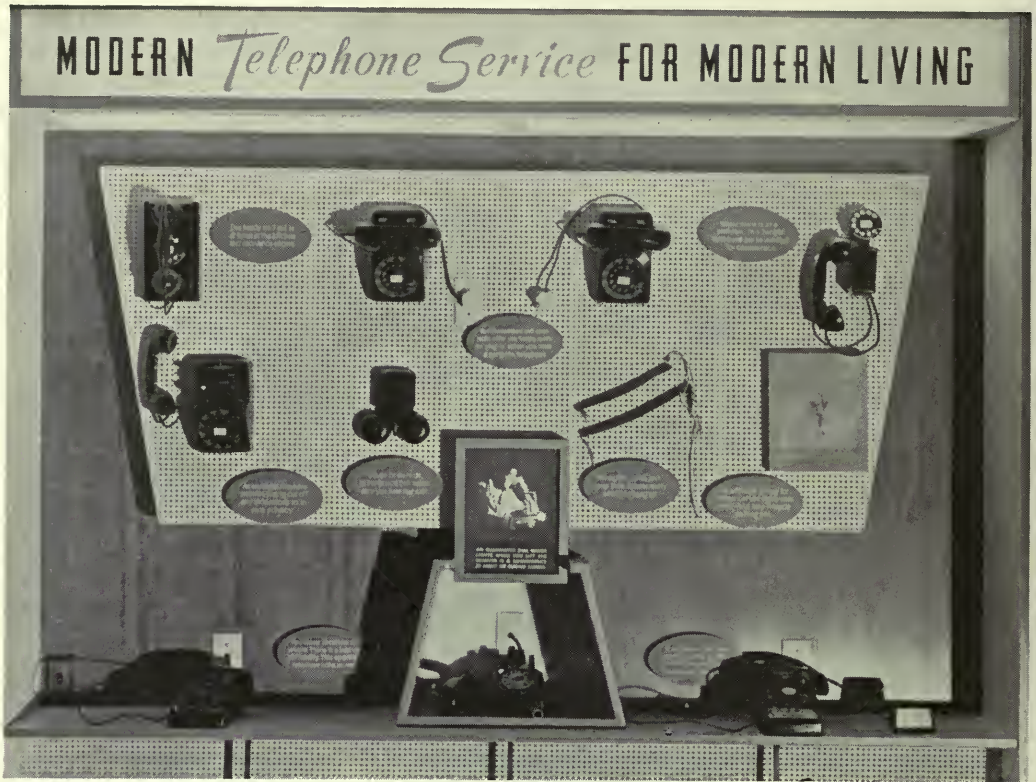
slow process and, when estimated requirements miss, there is danger of the field people getting frustrated before Western can really get into production.

We will do what we can to stimulate studies of the impact of special projects on earnings, recognizing of course that this is only one of the considerations influencing a decision as to the merit or worth of such projects. The Commercial people have used, in my opinion, unusually good judgment in recommending new rates for new facilities taking into account value of service, potential development, and customer needs as well as costs. I feel sure that adherence to these principles will result in a sound pricing structure.

And then we shall try to maintain a sufficient liaison with the Laboratories, with the Western, and with the O. & E. so that

Another "open house" group looks at telephone equipment.





The "modern" theme is stressed at a "Better Homes" exhibit.

merchandising influence will be reflected in functional design as well as in quantitative requirements. Again, I think the Laboratories have done a wonderful job in that connection. They have used the best available advice on designing and I think they have done an exceptionally good job in housing components so that together we get a rather pleasing effect in the finished facility. Surely this can be said of the cordless board, the #500 set, the mobile telephone, the new #100 key equipment and many other items, and I find a very conscious desire on the part of the Laboratories people to develop modern styles.

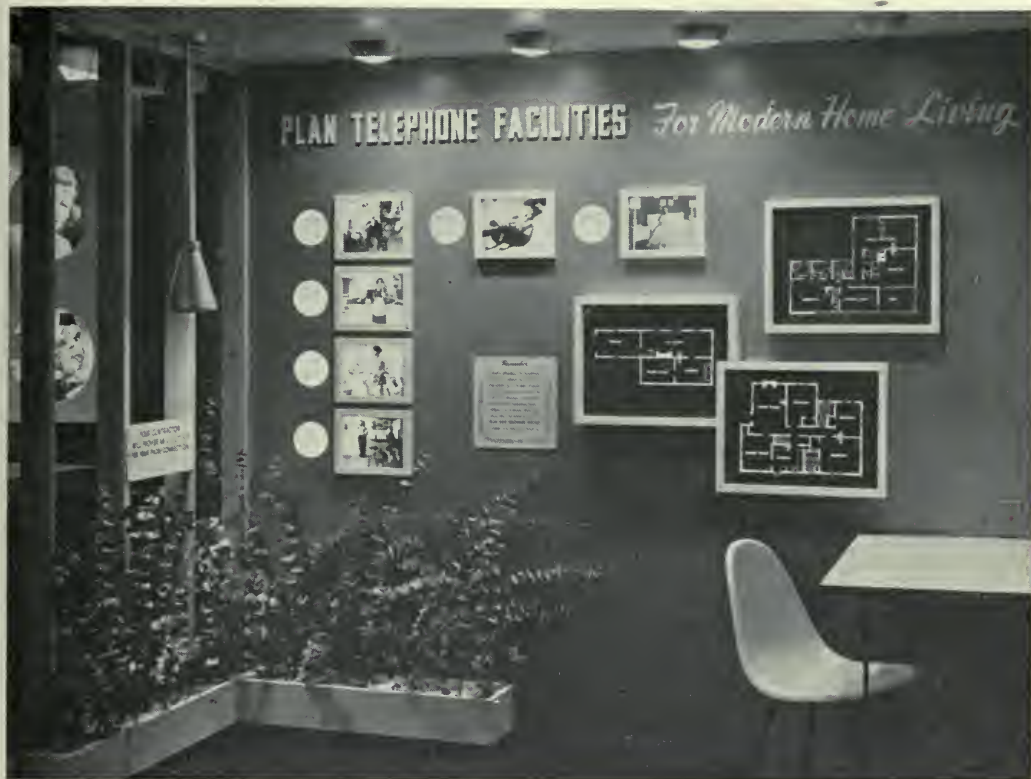
And as a final item—"to expedite availability." I won't try to explain what that means beyond saying we may have to hurry up sometimes. At the moment I don't

know how to accomplish it—but I have the feeling that a way will be found.

Summary

IN SUMMARY, I think it can be said that the Merchandising Department was created for the purpose of advising and assisting in every way possible all departments and all Companies in developing and executing a merchandising concept of this business to draw together the various efforts in this direction. We expect this activity will help our earnings problem, except, of course, in those cases where charges are below reasonable levels.

It is expected that successful merchandising efforts will give the user the kind of service he wants and needs, and with sound operations and proper pricing, produce



So is planning for adequate services in new homes.

sufficient revenues for a healthy business. You have only to reflect that we have telephones today in 27½ million homes. Eighteen million of these are party lines. And in these same homes are at least 55 million bedrooms, 27½ million kitchens, 27½ million living rooms. Add to this the nine million homes which have no service and the new households which are being formed every year (now at the rate of 800,000 a year), all of whom, old and new, are potential regular users of long distance. Do this and surely you have an exciting market. I hope and believe that we can help in developing it.

Let me also say that so-called competitive business faced with the problem of marketing its product is never hesitant to move into the field we profess to serve.

Maybe you have seen the 1955 edition of "New Products and New Sales Ideas." It describes products to supplant or to supplement telephone facilities and services, ranging from home intercom systems to automatic dialers to telephone book covers.

How will the Merchandising Department affect your department or your operations? So far as I am concerned, our aim is to interfere in no way with any existing operations. Most of the promotional work in this business must be done by the Operating people, and they have already taken hold and developed this new concept with enthusiasm. Last year I visited almost every Company, and several areas in many Companies, and nowhere did I find a lack of interest—but rather an eagerness to take on a part of the responsibilities for the

promotional side of this business. Nothing should be done to disturb that enthusiasm and everything should be done to encourage it.

I think the Commercial people have a splendid professional selling organization and they are doing a good sales job. This also is true of the directory sales work. And I am quite impressed at the rapidity and the thoroughness with which the Plant people have taken advantage of their opportunities to sell. The Traffic people, too, have shown their interest and initiative. It seems as if all departments have been awaiting the day when they could actively promote this business.

We in the Merchandising Department give support to these activities and will continue to so far as we can. We will pro-

vide advice and assistance in the over-all, and we hope that you will make use of such staff assistance as is set up both here in New York and in your Company. We want to keep the merchandising concept before all departments of the organization and before the public, and we should expect to assist with merchandising ideas. As I said, we propose to consult those outside our business who are recognized experts in this field, and I have hopes that we shall profit from such consultation. We shall continue to do whatever is possible to promote the idea that merchandising is not just a new word for sales. Merchandising should be the philosophy of the business, and I think more and more people are accepting it as such.

The Laboratories is merchandising when

New telephones and new services appear on a TV science show.



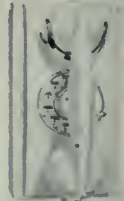
NEW LOOK for an OLD FRIEND!



Full-Color Telephone: Shows with choice of color or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish. Shows with choice of color or silver-plated finish.



Two-Tone Telephone: Designed to give pleasing contrast of colors. Shows with choice of color or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Wall Telephone: In such cases, shown in silver-plated finish or silver-plated finish. The silver-plated finish is available in silver-plated finish or silver-plated finish.

... PLUS extra conveniences we're making for Bell telephone users!



Light of Day Telephone: That is illuminated as shown in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Volume Control Telephone: Shows volume control as shown in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Colorful Buttons: Pulling up the control knob will automatically set all the buttons in the same color as the control knob. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



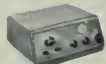
Button Control Telephone: Available in such cases as shown in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Speed Dials: The back of the dial is shown in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Push-Button Telephone: Shows in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.



Telephone Intercom System: Shows in picture. Shows in black or silver-plated finish. Also in black, chrome-plated finish or silver-plated finish.

Western Electric

This two page Western Electric advertisement in national magazines last Winter emphasizes color.

it incorporates the functional with design so as to make the facility pleasing in appearance.

Western is merchandising when it meets estimated requirements for instrumentalities and facilities—and on schedule.

The Financial people are merchandising when they find ways to raise the additional money necessary to expand a sales program.

The Engineering, Plant, Traffic and Commercial people are merchandising when their estimates of required facilities reflect, actually what the customer will want when he will want it. Then they are thinking of the customer, of pleasing him, of providing him with the best service within our power to provide.

Sales is the concrete expression of that philosophy in the effort to market our

goods and services. I have no apprehension about our ability to sell anything that is introduced for the public use, but I do have some apprehension that we may not be able to anticipate customers' wishes and needs and make available the facilities with which to satisfy those wishes and needs. But even beyond this, we must be looking forward to stimulate new wants for our services. For example, I think there are things to be done in residence intercom systems and rural services, including intercommunicating systems and business services yet to come. This is one of the areas in which I believe the Merchandising Department can be useful.

But whatever the Merchandising Department may subsequently contribute, it will be offered only to assist, and not to complicate, the Operating Departments'

activities. It may not be possible to avoid some differences of opinion, but I hope you will agree that if earnest, enthusiastic people are working toward common objectives, even functional differences can be overcome.

It is necessary, of course, that a new

project like this be accepted with objectivity and sympathy on the part of those who may have dealings with it, and it is doubly the responsibility of the new department to seek always, through tactful means and coöperative effort, the objectives which it was set up to accomplish.



Every contact with a share owner gives opportunity to demonstrate the management's interest in him and its regard for the welfare of his investment

EARNING THE FRIENDSHIP OF THE OWNERS OF A. T. & T.

S. WHITNEY LANDON

Secretary, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

THE TIME HAS LONG SINCE PASSED when there was any question whether good share-owner relations were worth working for. Today, everyone knows that they are—they are a “must.” The question today is what more can we do to foster this essential of modern corporate success.

The share owner starts out as our friend when he buys his stock, and if he does not stay that way, it is our own fault. That he stay friendly is important not only to us in the company, but to everyone in America. Stockholders are the owners of this great industrial machine which is America's strength and salvation, in both peace and war. What could be more important than that cordial and friendly relations, based on mutual understanding and confidence, should exist between these people who own the business and those who work for them and manage their properties?

When the War ended, in 1945, the American Telephone and Telegraph Company had about 680,000 share owners. From then

until 1951 our share-owner family grew to 1,000,000 and since 1951 we have added over 350,000 more. Thus, the number of our share owners has approximately doubled since the War, while our number of shares has a little more than doubled. This means that more owners rather than bigger own-

Note: In the issue of this Magazine for Summer 1950 appeared an article entitled “Here are the People Who Own This Business,” which described and pictured more than a dozen typical share owners from coast to coast. Indicative of the fact that our average share owner buys for long-term investment are the findings of a recent check that all but one of these people are A. T. & T. share owners still—nearly five years later, and that several have increased their holdings. It seems highly appropriate to illustrate the present article by reprinting the pictures of some of these same share owners in the following pages. EDITOR.

SHAREHOLDERS BY SELECTED SHAREHOLDINGS

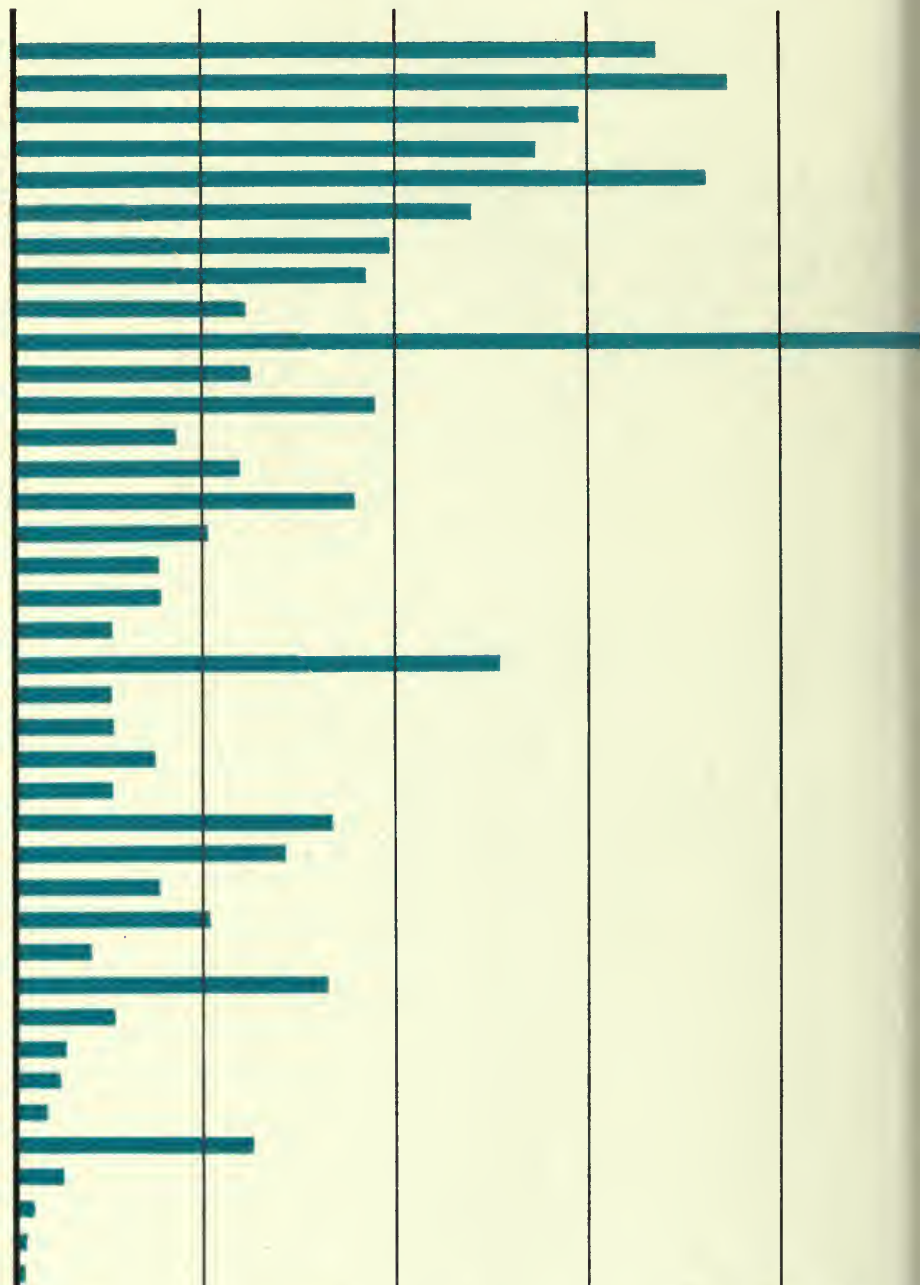
(as of Dec. 31, 1954)

SHAREHOLDING
GROUP

NUMBER OF HOLDERS (THOUSANDS)

0 20 40 60 80

1 SHARE
2 SHARES
3 "
4 "
5 "
6 "
7 "
8 "
9 "
10 "
11 "
12 "
13 "
14 "
15 "
16 "
17 "
18 "
19 "
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21 "
22 "
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24 "
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30 "
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45 "
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60 "
70 "
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90 "
100 "
200 "
300 "
400 "
500 "



Earning the Friendship of the Owners of A. T. & T.

ers have supplied our large post-war additions to equity capital—about four billion dollars.

Typically, our owner is a small investor. The average holding of our individual share owners is 30 shares. At the end of 1954, 66,000 persons owned one share; 75,000 owned two shares; 72,000 owned five shares; and 100,000 owned ten shares. These are the four largest share owner groups. Our share owners come from some 19,000 communities in every state in the Union, and from Alaska, Hawaii, and over 80 foreign countries. During 1954, 145,000 new share owners bought our stock. From our correspondence we know that for many of these, the purchase of our shares was their first stock investment. It is true that a sizable number of people have owned our stock for many years, but an even greater number are relatively new with us. It is an interesting fact that on the average, two new owners are needed for a net gain of one.

These small share owners are tremendously proud of their investment. The man who gets his first share is just as proud of that one share as the man with 100 shares—and probably even more so. Also, they have the natural ambition to increase their number of shares. Many of them tell us in their letters that they look forward to a goal of five or ten shares. Others are working to increase theirs to higher figures. In spite of this, the average number of shares per individual holder has not varied much. It has gone up a share or two during recent years, but not nearly as much as might be anticipated from the large amount of convertible debentures issued.

This means that while the existing owners are gradually building up the number of shares they hold, there is a steady stream of small holders coming in at the bottom



Mary and August Sandquist

all the time. This supply of brand-new share owners and the urge to build up more ownership on the part of the existing share owners are tremendously important to the financial health of our company. It is to these people that we must look for the money which is constantly needed for our growth and development. And if our present share owners are not happy and friendly toward the company, their urge to add more shares would die and the interest of new investors would soon dry up.

THE PURPOSE of all share-owner relations activities is to build up and maintain a friendly, coöperative, and understanding group of share owners. We want each one of them to feel that he or she is a part of the family—that he belongs. From a practical point of view, we need their money, and we want them to be happy that they have placed it with us and to be ready to give us more if we should need it. But aside from that, it is important that we have as



Frederika Peace Jenkins

many friends as possible throughout this country of ours.

Although share-owner relations usually head up to some one person, the responsibility and the credit go much deeper. Every employee of all the Bell System Companies plays an active part in our share-owner relations. Each is likely to have dealings with the owners of the business—often without ever being aware that the individuals with whom he or she comes in contact are share owners. In this sense, relations with the owners of a company are the day-to-day responsibility of all the officers and all the employees. It is, therefore, important that everyone on the payroll should be conscious of the fact that the business in which he is engaged is owned by the share owners, that they are interested in the way the business is run, and that they are entitled to know that the management and employees fully appreciate the important part the share owners play in the welfare of the business.

In approaching our share-owner relations job, we should realize that most of these people want to be friendly and cooperative, and they have a great pride in their company. This means that everything we write or say to them—whether it is a letter, printed material, or a personal contact—should be natural and human: as nearly as possible the way we would write or talk to a friend—a respected friend.

Share-owner relations are really a matter of human relations. Since our typical share owner in the Bell System is a small investor, we think our program ought to be conducted along lines that will maintain the understanding of people in all walks of life. This emphasizes the value of a plain-speaking, simple, down-to-earth, person-to-person approach—not talking down to people, but trying to meet with them as with the neighbor across the street or over the backyard fence.

Also, more of our individual accounts are held in the names of women than of men, and there is a marked growth in joint accounts, most of which seem to be held by husbands and wives. For this reason, there is value in trying to talk with our owners in a way that will be of interest to women.

SUPPOSE WE CONSIDER for a moment what the share owners are interested in about a company in which they have invested their money. They are, by and large, average Americans just like ourselves, and they have the same basic interests. In the first place, they want to know that their investment is safe and that the income they have counted on is reasonably assured. Of course, a company's regular annual and quarterly statements provide the basic facts from which each share owner can

Earning the Friendship of the Owners of A. T. & T.

reach his own conclusion, and this information is enough for many. But when questions are raised, we should be forthright in our reply. We cannot, of course, predict the future; but we can restate in everyday language the important facts.

But over and above the dollars and cents, share owners also want to feel that the management of the company is of high caliber and is reputable, not only so that they can rest easy that their money is in safe hands, but also so that they can feel proud of their company and the people in it and of its standing in the community—whether that community be some small city or the nation as a whole. It is the job of share-owner relations to interpret the work of telephone men and women to the share-owner group. I don't mean that we should pat ourselves on the back, but we can so state our aims and objectives that the share owners will have in their minds a favorable picture of the business and its management.

As part of this, I think it is helpful to personalize telephone people, including those in top management, so that share owners will feel that they know and like them. To be friends, the first step is to get acquainted.

One of the first things a new share owner receives from us is a booklet that pictures telephone folks on the job all over the country.

Not long ago, in our Share Owners' Quarterly, the directors stated what might be called a "creed"—their objectives in acting as directors. Along with this, the Quarterly included pictures of the directors and a thumb-nail sketch of each. This met with a very favorable response. Later, both the pictures and the statement were used as an advertisement. Also, a year or so ago an advertisement headed "Up from the Ranks," showed pictures of the presidents



Suzanne Fassknacht

of the Bell System operating companies, telling how each started and progressed. A recent Share Owners' Quarterly carried pictures of Mr. Craig's staff at 195 Broadway. I believe that these made the share owners feel closer and warmer toward the company and those they hold responsible for running it.

The share owners are also interested in the product or service sold by their company. The Bell System has made it one of its basic aims to try to have its service as good as possible. I think that the public feels that we are working very hard toward this end. As our share owners are also users of our service, this attitude on our part has, I believe, a real effect on our share owner relations. Conversely, when our service is not good, it has an adverse effect.

Share owners also have a great variety of other interests, as indicated by the questions they ask about the affairs and operations of the company. These questions are

important to the share owners who raise them, and they should be equally important to the company. Each of these must be answered promptly and fully.

WE HAVE VARIOUS MEANS at hand in trying to meet our obligations and the share owners' wishes in this regard. Our first contact with a new share owner is, of course, important. We in the Bell System, and most other companies, I believe, send a "welcome" letter to each one of these new share owners. As you can appreciate, this is quite an undertaking, as we have from 125,000 to 200,000 new accounts each year. Our letters are from the president and they are friendly and cordial. Each is as near to being a personal and individual letter as is possible with such a large number. They are received with enthusiasm and many of the new share owners write letters of appreciation in return. We often answer these

replies—and certainly do so if they contain any other comments or questions. The welcome letter also states that we would be glad to have any suggestions the share owner might have for improving our services or operations. Many take advantage of this and write us. I might mention that in our company the president has asked to have all letters from share owners sent to him so he can read them—except those dealing with routine matters such as changes of addresses, stock transfers, subscriptions, etc. He feels that this is well worth while.

Another effective contact is, of course, the annual report. This is a subject in itself, and I will not take time to discuss it here.

We also send the Share Owners' Quarterly with each dividend. We try to find something of interest in the operations of the company to include with the financial reports for the quarter. These Quarterlies serve to foster the feeling among the share owners that they know what is going on and are part of the undertaking. From the large number of letters we receive from share owners, it appears that they are happy to receive this material.

At about the same time that the president's welcome letter goes out, a booklet entitled "A. T. & T., Your Business" (already mentioned) and a copy of the latest annual report, together with the latest quarterly statement, are sent to the new share owner.

The whole objective of this part of the program is to make available to the share owner—and particularly the new share owner—as much information about the business as is reasonably possible and in a readable and interesting form. The purpose is to have the share owner feel at once that he holds an important place in the



George Lamb

Earning the Friendship of the Owners of A. T. & T.

company and that we want him to be informed about its operations and affairs.

So MUCH for the printed or formal material. The correspondence with share owners, which goes on every day, constitutes a continuing vehicle for establishing and maintaining good relations. Usually, the share owner initiates the correspondence. He has something on his mind which he thinks is important enough to write the management about. Certainly, he deserves an answer and I think it should be the very best answer that can be made. To the share owners, what we say is what the company thinks. Our interpretation of the company is the company to these people, if we are convincing.

Skipping for the moment the great mass of routine letters about changes of address, lost certificates, bond conversions, dividend checks, etc., letters from share owners dealing with almost every angle of the business are received at a substantial rate every day of the year. During proxy time their comments—either those written across the face of the proxy or letters sent with the proxy—become a veritable flood. Our objective is to answer each of these letters and comments fully and frankly—and with as much of a personal touch as is possible. Each one is individually answered and I am sure that the recipient has no feeling that he has been sent a form letter.

It has been surprising to me how many of these people reply to our letters, and they nearly always are enthusiastic and friendly. If the share owner's reply is merely a conclusion of our discussion, we usually do not answer. On the other hand, if some point is left open or some other point is raised, we always answer.

Before starting to reply to a letter, we always try to visualize the writer. Very



Linda Schmitz

often the letter gives rather clear indications of what he or she is like. This makes it easier to write a really personalized reply. A significant point about our share owners is that a large majority of them intend to hold their stock for the long pull. I think this should be an important part of our mental picture of the share owner. By and large, he is not the "in and out" type.

Many letters are complimentary to the management and on their face require no answer. However, it is usually wise to answer these also, so that the writer will know that we appreciate his thoughtfulness in telling us of his confidence in the company and his satisfaction with the management.

The critical letters are, of course, most important. They should be answered promptly and special care should be given to be sure the reply is friendly. If a share owner has a firm point of view on a subject, I doubt if we are often successful in changing his mind. However, our letter can



Tah-wat-is-tah-ker-na-ker

still be productive by setting forth our position in such a way that the share owner will see that we are broad-minded, that we have substantial reasons for believing or acting as we do, and that we are frank and forthright in our discussion with him. We have had repeated instances where, although the share owner stated that he or she had not changed his basic view, yet the whole tone of his letter was such that we knew we had made a friend by the exchange of correspondence.

We have found it advantageous to follow many of these critical letters with a personal visit or telephone call. In fact, these personal contacts have been most productive.

I think that most corporations have not gone half far enough with these personal calls on share owners. Nothing takes the

place of a friendly face-to-face talk. There is no reason why such calls should be limited to cases where the share owner is critical of something we have done. Every personal contact is all to the good—even when the share owner is 100 per cent friendly in the first place. Of course, the large size of share-owner families these days adds tremendously to the work involved in a program of this sort, but we don't need to try to do it all at once. The effect of whatever we are able to do will be cumulative as the years go by.

Often the letters from share owners contain suggestions for improvements in the operations of the company or complaints about something we are doing or the way we are doing it. Answering these letters is only meeting our obligation half way. We also pass the suggestion or complaint on to the proper department of the company for study, and for action where action is called for. The share owner is told what is being done. He has taken the trouble to write because he is interested in the welfare of his company, and he is entitled to know that his thoughts have received careful consideration and that they have been acted upon if they have merit.

THE ROUTINE CONTACTS with share owners during the year about changes of address, dividends, bond conversions, lost certificates, estates, stock transfers, and other similar matters are innumerable. These contacts may be by letter, telephone, or personal call. Again, it is important that we be prompt, understanding, and efficient in our handling of these matters, even though they are not as personal as the general correspondence. Each of these has its bearing on the quality of our share-owner relations, especially as they run into such large numbers.



August Larson

A year or two ago we figured that some 285,000 such cases were handled by our company each year. Take one item alone: about 30,000 of our share owners die each year—some 100 per working day. It was also estimated that during that year, total contacts with security holders and others interested in the company's securities, by mail, telephone, and at the counter, including dividend checks, proxies, annual reports, prospectuses, warrants, and security issue subscription and rights transactions numbered about 10 million. I quote these figures only to indicate the possible cumulative effect of all of these contacts added together and the importance of choosing the best methods of handling each of them.

Even in these rather impersonal transactions, the spirit of real friendship can be forged. Some time ago we had an exchange of letters with a share owner about the loss of three stock certificates which ended with this letter:

"Well, I just found the darn things, by accident. I was telling my neighbor, after the third cup of hot buttered rum, that there was an organized social life in the insect

world. To refute his incoherently expressed doubts, I strode with dignity to the crowded bookcase and picked out J. Henri Fabre's 'Life of the Fly' and there, next to the chapter on the bluebottles, were stuck my three lost certificates. That's a good book! I commend it to you . . . You may withdraw the 'stop transfer' notice and what not. All is normal again. I have the stock, my neighbor has more respect for bugs, and the rum is gone."

Everyone was happy. So many of these little incidents end in the same friendly spirit.

GOOD SHARE-OWNER RELATIONS must come from the very depths of us. We must believe in it wholeheartedly and must live it every day. Lip service with no sincerity behind it is worse than useless. Also, there are no trick formulas—no short cuts. It is everybody's job all the time—during good times and bad.

We need friends—both share owners and others—and we need them in every com-



Arthur Williams

munity. We can make these friends and keep them only by having a genuine and sincere interest in people and by doing the things that reflect such an interest. We, as individuals, do not make friends on a short-time basis. Neither can a company. Above all, we don't make friends after we find we need them. Neither does a company.

Perhaps it can be said that there are special reasons why public service organizations owe it to themselves to develop and maintain the best possible relations with their share owners. Not only is this consistent with a good public service job, but utilities, more than most other concerns, have to keep going to the public for new capital, and with earnings limited by regulation we need the utmost understanding of our problems and our efforts.

We must never forget that we are trustees—custodians. Not just custodians of the money share owners have put in our business, but—and possibly almost as important

—custodians of what these million and a third share owners think and feel in their hearts about business and business men. This is a heavy responsibility, and one which is with us every minute of the day.

I believe that a company has character, just like an individual, and it is our duty to interpret the character of our company to its owners.

Our correspondence and other contacts with share owners are important in establishing a corporate personality. The share owner who receives the kind of treatment I have been referring to will build up in his mind a definite impression of the personality of the company and its management. And what is equally important, he will talk about it to his friends.

Good share-owner relations is of the greatest importance to our company, and the responsibility for it rests with us all. It is a challenging job and one full of interest and satisfaction.

INDEX NOW AVAILABLE

AN INDEX to Volume XXXIII (1954) of the BELL TELEPHONE MAGAZINE may be obtained without charge upon request to the Public Relations Department, American Telephone and Telegraph Company, 195 Broadway, New York 7, N. Y.

The MAGAZINE is also reproduced on microfilm: one volume to a single roll of positive film, on a metal reel, suitably labeled. Inquiries concerning microfilms of the MAGAZINE should be addressed to University Microfilms, 313 N. First Street, Ann Arbor, Michigan.

HELPING OURSELVES TO GROW

H. RANDOLPH MADDUX

Vice President, PERSONNEL RELATIONS, A. T. & T. CO.

IF WE SHOULD UNDERTAKE an "Opinion Survey" and ask what are the principal reasons for America's greatness, one could safely hazard the guess that in the forefront of the summary of answers would be *production*. And production would be used in the sense that we have outstripped the rest of the world in our ability to make the material things of life and to do it much better than anyone else.

We are inclined to take this remarkable performance for granted because we have grown up with it. But we need to think more about it, inasmuch as we are far from reaching our limits in what we can and must produce. We need to be aware of how we have gotten where we are, in order to continue to do more and better—because more and better we shall be required to do.

The progress we have made has been—and will continue to be—the joint effort of two groups: those who directly produce goods and services with the work of their own hands and minds; and those who plan, study, design, and direct.

To hold our high place in the field of production requires the utilization of both groups, but especially of management, since a more accelerated pace needs to

be maintained in developing production methods, the creation of new machines, and better maintenance, to insure higher speeds and greater dependability. And now more than ever industry has come to recognize that such an accomplishment will be dependent upon the quality of its management—how well management measures up to its ever increasing responsibilities. Likewise, to pursue the human factor in this production equation, greater attention needs to be paid to developing people in industry so that management will be fully capable of solving the many complex problems arising from the need for greater production.

The Bell System for many years has recognized the importance of continuing growth of management people. Some of the very first formal training in management skills was in the Bell System, away back in the 1920's. Continuous effort has been made to improve this training, to extend it and broaden it, so that more opportunities are available than ever before to grow in management ability.

But these programs only help; growth is something that every person accomplishes for himself. We can be stimulated and en-

couraged by courses of training and by the interest of a good boss, but it is how we individually think and act every day that makes for growth. Nobody can really do this for us or even plan it for us.

HOW CAN WE MEASURE OUR personal growth? What are some of the tests that we can use to determine how we are doing? One suggestion would be that we try a little self-examination by each of us asking himself these five questions:

1. *Am I doing my job as well as I know how?*

The farmer who refused to buy the book on farming because he was farming then only half as well as he knew how had stopped growing. And he didn't want his comfort disturbed by having a book around to remind him of it.

Everybody faces a serious temptation to settle for a comfortable moderate develop-

ment of his abilities. But there probably is no such thing as a plateau of achievement in management ability: a person is either growing or slipping. It is something that every management person needs to be concerned about and on which he needs constantly to be testing himself. We all need to know where we stand.

2. *Do I take a personal responsibility for keeping abreast of ideas and developments important to broadening me as a person and to improving my job?*

We are in an era of change. Not only is this change evident in our business, but it is taking place rapidly in the total economic, social, and even political climate in which all business operates. To plan effectively and decide wisely, we must be aware of these changing economic, social, and political trends. We must be alert also to the problems and needs of our community, for each of us has personal responsibilities



in that area which, if they are recognized and properly discharged, will likewise be helpful in the broadening process.

3. *Am I willing to take necessary business risks or do I always play it safe?*

Again, planning and deciding—two of the major functions of any management job—involve taking necessary business risks. Outstanding leaders in business demonstrate over and over again that they have the courage of their convictions in taking necessary business risks for the good of the enterprise.

But risk-taking is an uncomfortable and disturbing process. It is much more comfortable to make a “safe” decision, when we are protected even if the decision turns out to be wrong, or to set up a plan with plenty of safe margins. But when we do this, we are limiting our growth. Apparently, a certain amount of uncomfortableness is necessary if we are to grow.

Unwillingness to assume the responsibility for decisions involving risks not only limits our own personal growth but has other more far-reaching and more serious effects. The manager who avoids risks and plays it safe limits the growth possibilities of all those who report to him. For example, such a manager cannot delegate responsibility for any important portions of the job, since such a delegation involves the risk of subordinates making mistakes. He must do everything himself, making all the decisions; he must play it safe. Such a management climate kills initiative, fosters discontent, and stifles the growth of all who must live in it.

4. *In my planning and decision-making, do I depend on my pre-conceived notions, opinions, my “experience,” or am I willing to take a research point of view?*

If I have the research point of view, I will be looking for opportunities to test my

ideas, to put them in the laboratory, so to speak; I will be willing to depend on information, systematically secured, even if it is at variance with my pre-conceived notions. This flexibility is one of the most distinguishing characteristics of the mature manager.

5. *Am I a good listener? Am I willing to listen?*

The first step in effective communication is listening. There are three ways of getting at the necessary data on which to manage: reading, observing, and listening. Most managers probably are much better readers and observers than listeners.

Listening, as used here, can be defined as an attitude toward other people and what they are attempting to express. It begins with an outward attention and an inward alertness. It includes the habit of making constructive responses that help the other person to express both his thoughts and his feelings. The good listener tries to hear everything that is being said, not merely what he expects or wants to hear. Skill in listening gives the listener a better grasp—a better understanding—of what other people have to tell him. And the ability to listen communicates something which is almost universally good.

WHILE THESE FIVE QUESTIONS set up some important guideposts that might be used, it is well to remember that to grow requires effort. And the successful development of management people requires that the individual exert himself—that he help himself to bigger things. Furthermore, as someone has said, “A man may allow himself to be enlightened on various points, even upon matters of expediency and duty; but, after all, he must determine his course of action for himself.”

Recent studies show important effect employees have on public's attitude toward our business, and emphasize factors affecting that relationship

TELEPHONE EMPLOYEES AND PUBLIC RELATIONS

JOHN W. COGSWELL

Employee Information Manager, A. T. & T. CO.

"A FELLOW was here yesterday to fix the phone. I got chatting with him, and it was very interesting. I learned quite a bit about the telephone. He was certainly sold on his job. And you know, other workmen, when they quit—they leave such a mess. This fellow actually asked to borrow a dustpan and broom. I nearly fell over when he said he wanted to clean up."

The customer who said that seems to have been favorably impressed, doesn't she?

Said another, "I know a young girl down the street from me who works for the telephone company. She's doing all right, too—buys herself nice clothes and things. As a matter of fact, she's got *my* daughter sold on going down there to apply for a job."

Comments like these, made by customers of ours, are nice to hear, aren't they? But how about one like this:

"After listening to Joan complain for the past six months, I wouldn't want to work for the telephone company. I suppose a big company like that is okay, but from what I hear, it's not for me. You can have it."

Several intensive research studies have been made recently aimed at learning more about the "anatomy" of customer attitudes: *why* people have the attitudes they do toward our business, and *where* they get their ideas and information.

As a result of these studies, it is clearly evident the personal contacts that take place between the public and telephone employees are of great importance.

From listening to us or watching us, at work, at home, or around town, people form their own opinions about the company and its services. They begin to think of it favorably—or unfavorably. Just about everybody in our business is a public relations representative. An "ambassador" for the company.

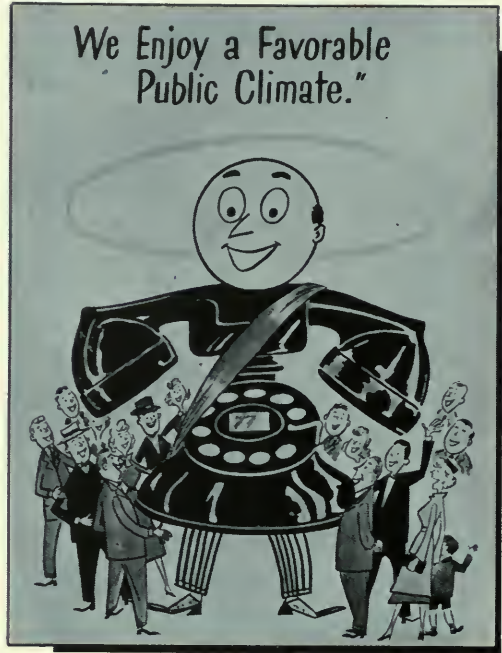
So when we hear a youngster say, "I wouldn't want to work at the telephone company," we begin to wonder. What happens when telephone company people meet the public on and off the job? How do employees act as ambassadors?

Since public opinion is so strongly influenced by contacts with employees, we

asked Douglas Williams Associates, specialists in community and employee relations, to see if they could get the answers to some of these questions for us. They spent considerable time, in three cities, talking and visiting with employees and their friends, relatives, neighbors and acquaintances. Some highlights of their report prove both interesting and challenging.

To begin with, they report that judging from studies they have made for other industries, we have an unusual and highly favorable climate of public attitude in which to operate.

In these cities, most of our subscribers approach their contacts with the company and with telephone employees *expecting* they will be satisfied. Employees seem to be aware of this, and generally find it gratifying to be identified as part of the telephone company. Their contacts with the public are mostly pleasant.

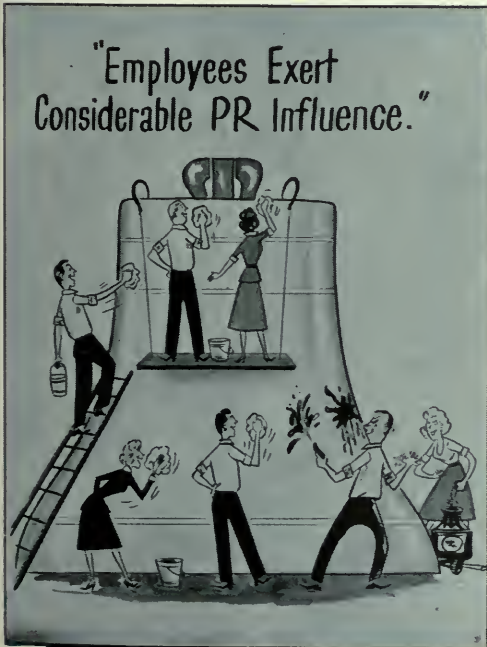


We Like to Talk

MOST EMPLOYEES are willing to talk about their jobs and about the company when they are away from work. While this is probably true to some extent of employees of any company, the unusually high degree of willingness among telephone employees is significant.

For one thing, the telephone is a conversation "natural." It's important. People have frequent experience with it; the "way it works" has curiosity value. So, more than in most other businesses, telephone employees become aware of the public interest in the company and the instrument, and generally like to discuss them.

Sometimes, though, they're not so happy about it. For, when they are asked the same questions over and over again, or when they don't have even the two or three facts necessary to handle the questions, or when they are blamed for something they feel they can't help—then they are bothered *very* much.





Employees don't like to see their company get kicked around. It's not that they go out of their way to head off trouble or volunteer information. Actually, they very seldom take the offensive, and most "Talk-



ing Contacts" with the public are initiated by the other party. But just let someone become publicly critical of the telephone company—then employees usually jump in and defend the company.

Kinds of Off-the-Job Contacts

BASICALLY, there seem to be five principal kinds of employee off-the-job contacts:

1. *Family.* These contacts occur frequently, cover a wide and intimate range



of subjects about the company and about the job, and are generally uninhibited. They are important because the employee influences his family, and also because the family in turn has considerable influence on the employee and the attitude he brings to work. Further, the employee's immediate family very often becomes important as ambassadors—for good or bad—in their own right.

2. *Close Friends.* These contacts occur quite frequently and cover a wide range

of subjects, but they're generally more guarded and far less intimate than those with the immediate family. They carry a lot of influence on employee recruiting.

3. *Casual Acquaintances.* Social contacts with casual acquaintances or people met for the first time often lead into telephone talk, but, typically, these contacts tend to be on more superficial matters than the others. Evidently, much opportunity for positive ambassadorship is being lost in these contacts.

4. *Other Employees.* Surprised at this one? Well, just put two telephone people together, no matter who else is in the group, and they'll soon be talking telephone. These talks occur frequently, and take place whether anyone else is present or not. Because employees have common job experiences to discuss, these conversations are the most uninhibited. Much of the public's impression of us as a company comes from just overhearing or listening to employees talking together.

5. *Neighbors.* Surprisingly enough, these contacts occur less often than with any of the other groups, and usually are not very intimate when they do take place.

Non-Verbal Impressions

THE RESEARCHERS found that the public's attitudes are influenced not only by what they hear from employees, but also by the "non-verbal" impressions they get from seeing them at work, at home, or around town.

How they dress, how they act, the way they keep their homes, their cars, how they drive a truck or a car, how they go about their jobs all are noticed. The kind of citizens they are, the clubs or organizations they belong to, their participation in community activities, the kind of neighbors



they are—these things help form the public's impression of them as individuals and of the company of which they are representatives.

On the less favorable side are some customers who make cracks about seeing telephone men "just sitting around" or "taking life easy" on the job.

Importance of Job Attitudes

WHEN THE Williams people started their interviewing, they soon discovered they couldn't sit down and talk with employees merely about contacts they have with the public. Employees wanted to discuss their job attitudes, their reaction to company activities, or their feeling about the cities they live in.

The researchers found that how much employees are told or know about facts pertaining to the telephone company is far less important to their ambassadorship than is their basic satisfaction and enjoy-



ment of their jobs. To quote directly from the findings:

"How and what employees feel about their jobs and the company affects not only what they say and do in public, but how they receive and appraise information from the company."

The emphasis is clear; job attitudes are perhaps the most important factor influencing the character of their role in public relations.

More Information Would Help

MOST EMPLOYEES feel adequately informed, but reveal information needs just the same. Many say they could use more information of specific kinds to help them answer public questions and correct public mis-impressions.

Someone once remarked, "Faith can move mountains, but a well-trained engineer would use dynamite, despite the extra cost." It is one thing to have faith without facts; it is another to be able to have some-

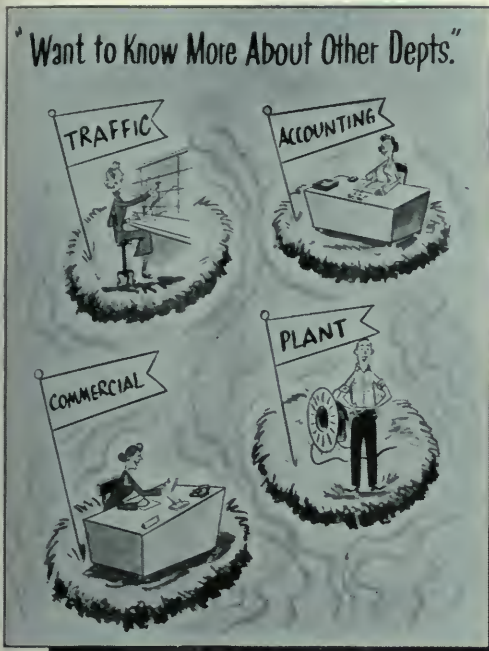
thing—just two or three points—to fall back on when a question is raised or a challenge issued. Attitudes are perhaps the key to whether an employee *tries* to do a job in the company's behalf; facts are a prime determinant in how well he succeeds.

Some employees say that on specific scores they get little or no information, and cite requests they get from customers to illustrate their point. The people outside the company, they say, would like to know more about rates, cost of specific equipment, availability of new equipment, availability of private lines, and other such information primarily as it applies to *them* personally. There seems to be a great demand for information of a *local* nature.

What's With Other Departments?

ANOTHER POINT the researchers brought out is that many employees feel poorly informed about departments other than their own. They say they would like to know more about the activities and functions of





other departments, and think that "employees in other departments should know more about us." This is particularly significant because lack of interdepartmental knowledge means that important opportunities for positive ambassadorship are going by the board. Every time we say, in response to a customer's question, "I wouldn't know about that—it's not my department," we miss a chance to score a plus in our public relations.

Sometimes Communications Don't Register

VERY OFTEN, company communications to employees fail to "reach" them, let alone get passed on by them to others. Some information, even though we go through the motions of communicating it, is never really absorbed or understood.

As one employee said, "They keep drumming those big figures into you. The company spent so-and-so-many million for this, and so-and-so-many million for that. Doesn't mean much to me. I'm just a reg-

ular guy—not a company vice president. They're talking over my head—way over it!"

Some employees say they're given too many facts at one time; that they can't remember all they are told even if they try.

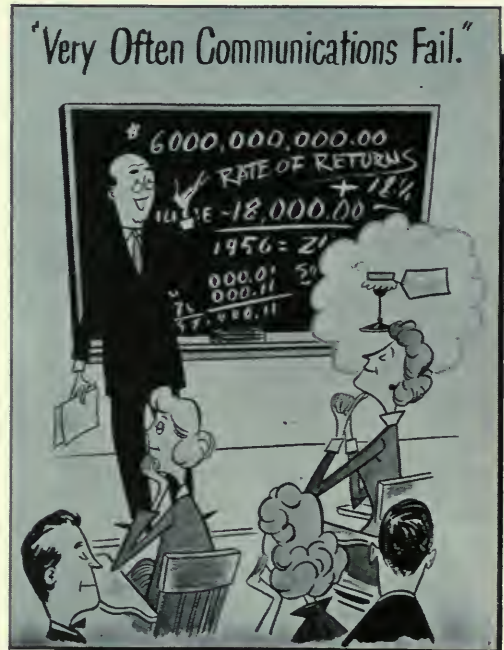
Reaction to Specific Methods of Communicating

THE METHODS of transmitting information that employees like best seem to work best also from the company point of view.

Small two-way meetings seem most effective and best liked of the formal communications methods used. For instance, here's one employee comment that illustrates two of the reasons why employees say they prefer small meetings:

"I like meetings best—the *small ones* where you're not afraid to *ask questions or speak your mind*. If you don't get the point the first time around you can ask, or at least somebody will."

The real key to the success of these small





meetings, however, is the leader. If he is personally accepted by the group, knows the subject, has the authority (or access to it) to answer employee questions, and if he promotes real participation, those attending the meeting will then come away with the feeling that they have really learned something.

What Do We Learn from This Report?

OUR PUBLIC RELATIONS SITUATION is distinctive, even unique. The company fills a public need and is ever-present. Most people hold it in high regard, and are *interested* in it.

But several needs have been expressed through this study. Maybe we were aware of them before, but not entirely aware of how strongly people feel about them.

1. Importance of job attitudes. There are many indications throughout the report of the things that influence the way people feel about their jobs. When people get a lot of satisfaction out of their work, they

not only reflect their feelings to outsiders, but are more effective workers on the job.

2. There are strong indications that there is much we can do toward keeping our people better informed about the work in other departments. The Williams people characterize this as a "surprising miss on the part of the telephone company."

3. Very often, information which is considered important fails to "reach" employees. Much of it lacks personal interest or involvement for employees. Especially facts and figures, finances, broad corporate affairs. Some say we give them too many facts at once; that they can't remember all they are told.

4. Employees want an opportunity to ask questions and express their ideas in small, two-way meetings. Information isn't really absorbed or understood when it is received merely through written material or lecture-type meetings in which no *real* opportunity to "speak my mind" is provided.

Telephone Employees and Public Relations

WE DO NOT WANT to make the mistake of drawing general conclusions from this initial study. This is based on findings involving three communities of about the same size and characteristics—and in only one section of the country.

How broadly applicable are these findings? Are there differences in the pattern as we move from one section of the country to another? Do those of us who live and work in major metropolitan centers think and act differently in our public relations role? Are the suburbs of large cities still

another matter? And do small towns present an even different picture?

Much remains to be learned before we can reach any general principles. But a start has been made, and one important fact stands out: *the same job satisfaction that reflects itself on the job in improved results is reflected off the job in improved public relations.*

We are ambassadors—all of us. Good ambassadorship depends mainly on two things: our feeling about our job and our having enough information so we can speak with assurance.

Ever since World War II we have been working to get ahead of the enormous demand for telephone service. Year after year we have built new lines and buildings and switchboards, and added new millions of telephones. Each year also, investors have provided hundreds of millions of new capital for telephone expansion—seven billion dollars since 1945.

Nevertheless new demands for service have continuously crowded our facilities. It is true we have steadily cut down backlogs—greatly extended dial service—made the telephone more reliable and trouble-free. But many times, to our regret, we have had to ask people to wait; and frequently we have had to offer customers a little less service, or perhaps a little different service, than they might personally choose.

By 1954, however, in most places this situation had markedly changed.

With new facilities increasingly available, we could promote the advantages of *complete* telephone service for home and business.

We could promote and sell the speed, convenience and economy of long distance service, and show businessmen how to profit by its use.

We could market new services and refinements of existing service, and find new ways to make all the telephone's uses more satisfactory from the customer's point of view.

*From the A. T. & T.
Annual Report for 1954*

*"Telephone Statistics of the World," annual publication
of the Chief Statistician's Division, reports on
development in some 200 separate countries or areas*

GEOGRAPHY AND THE WORLD'S TELEPHONES

ELIZABETH WRENSHALL

CHIEF STATISTICIAN'S DIVISION, COMPTROLLER'S DEP'T., A. T. & T. CO.

TELEPHONE DEVELOPMENT in any part of the world is the result of many factors, not the least of which is the geographical location of the country. Obviously, telephones are to be found with population. But the converse is by no means true, for countries with large populations do not necessarily have high telephone development. Some of the reasons for variation in world telephone distribution are of general interest.

More than half of the 89 million telephones in the world at the beginning of 1954 were in the United States, more than a quarter in Europe. These and other facts are contained in the current issue of "Telephone Statistics of the World," a report compiled annually by the Chief Statistician's Division of the American Telephone and Telegraph Company. Some 200 countries or areas are listed, of which only the most telephonically important will be mentioned here.

Mark Twain said in one of his books that all descriptions of scenery had been omitted, but that people who liked that

sort of thing could find it in the appendix. Most of the statistical tables which are presented in the report have likewise been left out of this article, but those who are interested in further details may obtain a copy of the publication from the Public Relations Department of the A. T. & T. Co.

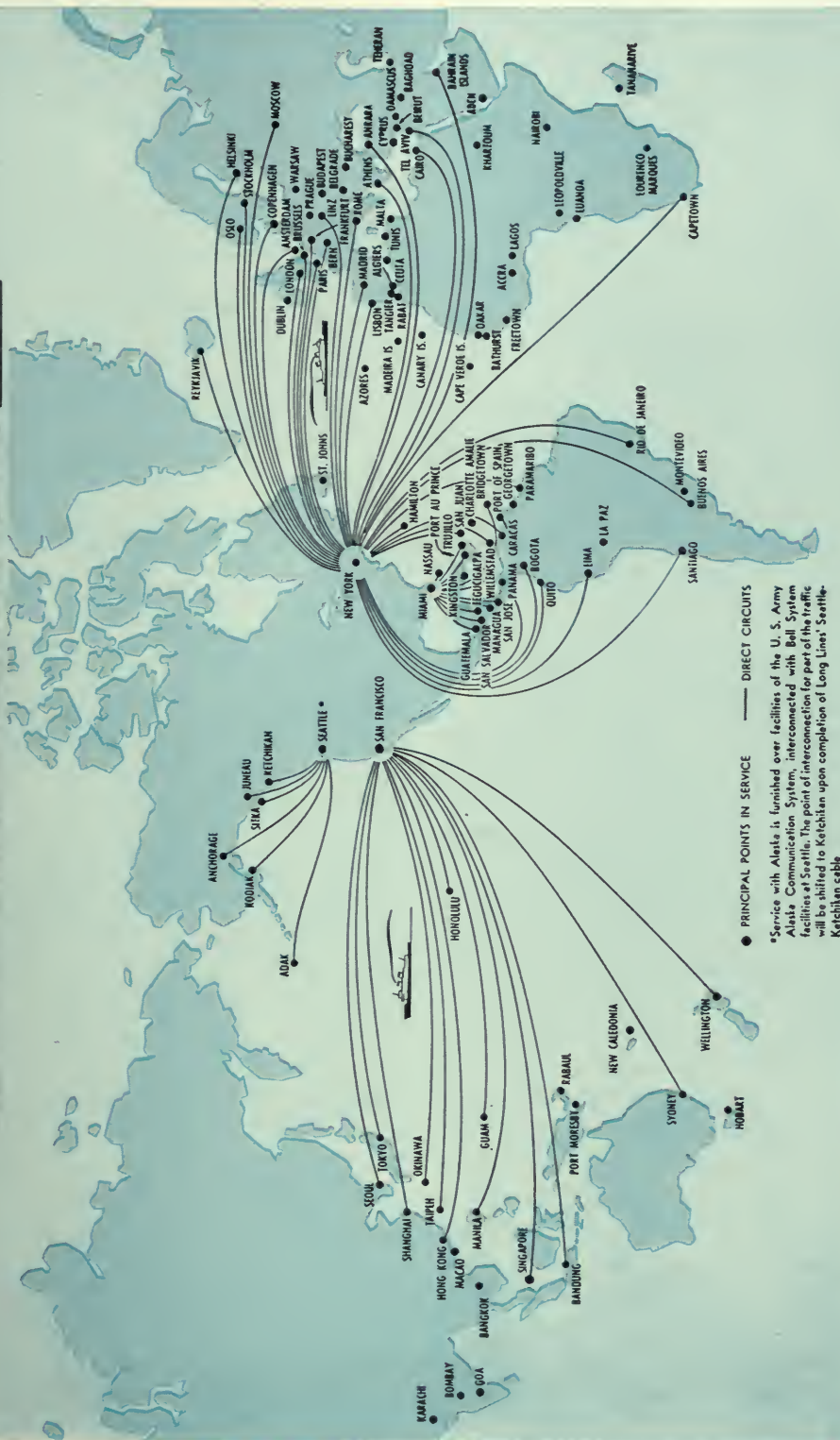
North America

NORTH AMERICA was favored by nature in its location, climate, and resources. The two largest oceans have protected it, and at the same time have brought world trade to its shores. Consisting of the United States, Canada, Alaska, Greenland, and the Territory of Saint Pierre and Miquelon, it contains 16 per cent of the earth's land area, seven per cent of its people, and 60 per cent of its telephones.

United States. The United States, with more than 50 million telephones at the beginning of 1954, was foremost among countries of the world with respect to both the actual number of telephones in service and

BELL SYSTEM OVERSEAS TELEPHONE SERVICE

DECEMBER 1954



TELEPHONE STATISTICS OF THE WORLD

January 1, 1954

TELEPHONES IN CONTINENTAL AREAS ⁽¹⁾									
CONTINENTAL AREA	TOTAL TELEPHONES			PRIVATELY OPERATED		AUTOMATIC (DIAL)		CONNECTING WITH BELL SYSTEM	
	NUMBER	PER CENT OF TOTAL WORLD	PER 100 POPULATION	NUMBER	PER CENT OF TOTAL TELS.	NUMBER	PER CENT OF TOTAL TELS.	NUMBER	PER CENT OF TOTAL TELS.
NORTH AMERICA	54,000,600	60.5	30.6	53,460,400	99.0	41,603,500	77.0	53,978,700	100.0(2)
MIDDLE AMERICA	670,000	0.8	1.2	597,700	89.2	502,000	74.9	659,700	98.5
SOUTH AMERICA	2,245,500	2.5	1.9	1,054,500	47.0	1,808,200	80.5	2,145,200	95.5
EUROPE	25,400,700	28.5	4.3	3,982,700	15.7	18,703,800	73.6	23,324,300	91.8
AFRICA	1,181,200	1.3	0.5	22,200	1.9	819,300	69.4	1,024,600	86.7
ASIA	3,662,200	4.1	0.3	2,729,800	74.5	1,696,700	46.3	2,516,100	68.7
OCEANIA	2,039,800	2.3	14.6	143,500	7.0	1,348,100	66.1	2,031,400	99.6
WORLD	89,200,000	100.0	3.6	61,990,800	69.5	66,481,600	74.5	85,680,000	96.1
UNITED STATES	50,372,972	56.5	31.3	50,372,972	100.0	39,100,000	77.6	50,368,796	100.0(2)

(1) Partly estimated. Statistics reported as of other dates have been adjusted to January 1, 1954.

(2) Virtually all connect.

the number in proportion to population. One telephone was available for every three persons, on the average, as compared with one for every 28 for the world in general. There were eight times as many telephones in service here as there were in the world's second-largest system.

The 20 principal telephone subsidiaries of the American Telephone and Telegraph Company, tied together by the Long Lines Department, operated about 80 per cent of the telephones in the United States at the beginning of 1954. In addition, there were some 5,000 other private companies which furnished telephone service. There were more than two million people who either shared in the ownership of the country's telephone industry or were engaged in telephone work. Thirty-two million households had telephone service. Nearly 15 billion dollars' worth of physical plant and equipment stood behind the finest communications system in the world.

Telephonically, our metropolitan areas

are among the best equipped. The three cities of New York, Chicago, and Detroit had, in the aggregate, more telephones than any *country* other than the United States. The development for the 256 cities in the United States with a population of 50,000 or more averaged about 40 telephones per 100 persons each. There were only ten large cities outside the United States with an individual development as high as the average for our cities of 50,000 or more. Good service, however, is by no means confined to our metropolitan areas. Telephone development in the United States outside these metropolitan areas was 25 per 100 persons. Only one other country—Sweden—had even an over-all development as high.

Canada. Canadians used their telephones more often in 1953 than any other folk, making an average of 411 calls per person as compared with 385 for the United States, 309 for Sweden, 262 for Denmark, 122 for

Geography and the World's Telephones

Australia, 81 for Spain, 73 for the United Kingdom, and 45 for France.

Canada, second-largest country in the world, larger than continental Europe, has a population density of only four per square mile. A large proportion of the population is concentrated in an irregular coast-to-coast strip just above the Canada-United States border. Natural barriers running north and south divide the country: forests isolate the Maritime Provinces on the Atlantic; the Rockies cut off British Columbia on the Pacific; a rocky region separates the central portion of Canada into the Prairie States to the west and the Ontario-Quebec section to the east. These several concentrations of population have had an effect on development of telephony in Canada, for it was only in 1920 that regular interconnection between the zones was established. In 1931 the Trans-Canada Telephone System, composed of the seven major telephone systems of the country, was formed to handle through toll traffic and settlement between the systems for such traffic.

With more than $3\frac{1}{2}$ million telephones in service at the beginning of 1954, Canada's system ranked third in point of number of telephones as well as in the number in proportion to population. The two largest provinces, Quebec and Ontario, together accounted for nearly 70 per cent of the country's telephones, 60 per cent of its people.

The largest city in Canada is Quebec's capital, Montreal. America's second-largest seaport and the world's largest inland port, it had 35 telephones for every 100 population.

Nearly a million people live in Toronto, Canada's second-largest city, great industrial and commercial center on the Great Lakes. Toronto had the greatest number of

telephones and the highest development in the country with 44 telephones per 100 persons. One-fourth of Canada's total telephones were located in the two cities of Montreal and Toronto.

Latin America

EARLY DEVELOPMENT of telephony in Latin America was slow, for a number of reasons. Colonization by the Spanish, Portuguese, Germans, and Italians introduced a variety of languages and cultures. Its countries are far distant from old established world markets. Internal transportation in South America is difficult. The mighty Amazon drains a large portion of the continent, but it flows through forest so dense that parts remain unexplored. Two-thirds of the continent is in the tropical zone where the climate is unfavorable to human habitation. The population is concentrated in areas widely separated by rugged natural barriers. Small wonder that growth of the telephone was slow!

Since the capital necessary to the installation and maintenance of telephone systems was not available in the countries themselves, it had to be obtained from foreign investors in Europe and the United States. Numerous small systems, of diverse ownership, were installed in the principal towns, with little over-all planning toward standardization. A large proportion of the total telephones were located in the metropolitan areas of most of the South American countries, while facilities were inadequate in the smaller towns and practically nonexistent in the rural areas.

Telephone growth has increased appreciably in recent years, however. In the five years prior to January 1, 1954, total telephones in South America increased by 43 per cent, as compared with 33 per cent for North America and 34 per cent for Europe.

Argentina, Uruguay, and Chile, all of which have made great industrial progress, have the highest telephone development in South America. Argentina, with about as many telephones as all the rest of the continent together, attained its millionth telephone during 1953. The total number was increased by 47 per cent during the five-year period referred to above. Chile has had an efficient system for years in spite of obstacles presented by the peculiar configuration of the country. Cuba is served well by modern telephone plant, as are many other individual places. But the overall development of Latin America is low as compared with that of North America, Europe, and Oceania.

Europe

EUROPE, more deeply penetrated by the sea than any other continent, with a profusion of islands about its coasts formed by detached fragments of land, is so open to ocean influences that it has a great many rivers of varied types.

The majority of Europe's 25 million telephones served the industrialized countries of the west.

United Kingdom. The United Kingdom of Great Britain and Northern Ireland, comprising several thousand islands rather than only two as is generally supposed, with a population of some fifty million, had nearly twice as many telephones as any other European country. There was, roughly, one telephone available for every eight persons. About 30 per cent of the total served Greater London. Four other cities in the U. K. had more than 100,000 telephones: Birmingham, industrial town and railway center; Liverpool, seaport situated at the estuary of the Mersey; Manchester, textile center; and Glasgow, Scot-

land's great shipbuilding and industrial city on the Clyde.

A branch of the General Post Office operates virtually all of the telephones in the United Kingdom.

Germany. Germany is an industrial country. A remarkable network of waterways, navigable far inland for ocean-going vessels, has provided the country with efficient transportation to the ocean and to world trade.

The Federal Republic of Germany, the official name of the portion known as Western Germany, which, like the United Kingdom, had a population of approximately fifty million at the beginning of 1954, had the second-largest telephone system in Europe. There was one telephone, on the average, for every 15 persons. Three of the cities of Western Germany had more than 100,000 telephones: Frankfurt on the Main, long a place of trading importance; Hamburg, seaport and shipbuilding center; and Munich, center of graphic arts.

The Democratic Republic of Germany, which is the name given to the Eastern or Soviet Zone, has not reported telephone data, nor has the Soviet Zone of Berlin.

France. France's coast-lines give access to busy trade routes, and her land borders connect her with populous countries. Many watercourses provide excellent irrigation, power, and internal communication. Although the country is largely agricultural, important manufacturing cities are located on the principal rivers. It is in these towns that most of the telephones are found.

The 2,800,000 telephones in service at the beginning of 1954 placed France's system third among those of Europe with respect to size. More than one-fourth of the country's telephones were in Paris. Lyon had

Geography and the World's Telephones

PRINCIPAL COUNTRIES HAVING MORE THAN 15 TELEPHONES PER 100 POPULATION

There was no change in the relative standing of the countries over that for the previous year. Sweden has ranked second only to the United States with respect to telephone development since the beginning of 1939.

1. UNITED STATES	31.27	5. NEW ZEALAND (1)	21.86
2. SWEDEN	27.73	6. DENMARK	18.73
3. CANADA	24.01	7. AUSTRALIA	16.07
4. SWITZERLAND	21.90	8. NORWAY (2)	15.79

COUNTRIES REPORTING MORE THAN ONE MILLION TELEPHONES IN SERVICE

Argentina, which has a higher telephone development than any other country in South America, attained its millionth telephone during 1953.

1. UNITED STATES	50,372,972	6. JAPAN (1)	2,594,506
2. UNITED KINGDOM (1) (3)	6,139,229	7. SWEDEN	1,994,378
3. CANADA	3,603,900	8. ITALY	1,774,462
4. GERMANY, FED. REP. (1)	3,255,971	9. AUSTRALIA	1,432,776
5. FRANCE	2,768,951	10. SWITZERLAND	1,074,216
11. ARGENTINA			1,001,158

(1) March 31, 1954.

(2) June 30, 1953.

(3) Includes the Isle of Man, but not the Channel Islands.

the next-largest system, while the network serving the seaport town of Marseille ranked third in size. The telephones of France are operated by the government through the Administration of Posts, Telegraphs and Telephones.

Switzerland. Switzerland, a land-locked republic, prosperous and beautiful, about twice the size of New Jersey, is highly industrialized, producing watches, precision instruments, machine tools, and textiles. Yet most Swiss live in small towns or in the country, because the industry is so decentralized. The five cities which had more than 100,000 population accounted for 20 per cent of the country's people, 40 per cent of its telephones. Zurich, the great banking center, by far Switzerland's largest city, had 16 per cent of the nation's 1,100,000 telephones.

Scandinavian Countries. The people of the Scandinavian Peninsula have overcome the

handicaps inherent in mountainous rocky soil located in northern latitudes, and have placed themselves in the vanguard of the telephone industry as well as of many other fields of endeavor.

SWEDEN, with 28 telephones per 100 persons, again ranked second only to the United States in telephone development. Denmark and Norway were also among the 15 countries of the world having a density of more than 15 telephones per 100 population.

Stockholm had a higher telephone density than any other large city outside the United States. Sweden's second-highest concentration of telephones was in Göteborg, the country's greatest port. Metal-working industries producing world famous Swedish steel products, lumber mills on the Baltic, manufacture of forest products in Linköping, all create a demand for Sweden's telephone service.

The Swedish Telecommunications Ad-

ministration operates virtually all of the country's telephones.

DENMARK, a small country with few raw materials, has made the most of its arable land and has planted it in grain for feeding live-stock. Processing and exporting high quality dairy products has become the most important industry. Copenhagen, the capital, famous for craftsmanship in porcelain and silver, contains nearly half of Denmark's 826,000 telephones.

NORWAY is the most electrified country on earth, for its many rivers with rapids and waterfalls provide an abundance of cheap electric power. Electrochemical industries in Oslo and Trondheim, fishing and fish processing, are major industries contributing to Norway's high telephone development. Oslo, politically and economically the capital of Norway, located in the most fertile part of the country, had one-fourth of Norway's 531,000 telephones. The second-largest system served Bergen, an important fish-shipping center.

Africa

THE UNION OF SOUTH AFRICA, the continent's southern-most country, contains more than half of Africa's telephones, and the comparatively small countries along the north coast account for about one-third of the total. The rest of Africa's vast expanse is served by about as many telephones as there are in Denver, Colorado.

Industry in Africa has made substantial progress since World War II. There are three times as many telephones as there were in 1946.

Asia

ASIA CONTAINS more than half of the world's people and one-third of the world's land-

area. It has every variety of climate and every type of vegetation. It has more ethnic types than any other continent. It was the birthplace of the great religions and the cradle of civilization. Yet it has been very slow to adopt the advantages of industrialization.

Asia had some 3.7 million telephones at the beginning of 1954, seventy per cent of which were concentrated in Japan, a country a little smaller than the State of California. China's system was the second largest of the continent, followed in size by those serving India and Turkey.

Japan and Israel had the highest development in Asia, with three telephones per 100 population each.

Oceania

OCEANIA is a geographical area containing many thousands of islands, extending from Australia on the west to Easter Island in the east, and from New Zealand in the south to Midway Island in the north.

Australia, which for some purposes is itself considered a continent, roughly the same size as the United States, had 70 per cent of Oceania's telephones. New Zealand, composed of two large islands and several small ones, had 20 per cent of the area's telephones. The raising of livestock is the principal industry in both countries. Controlled immigration has resulted in homogeneous population, with fewer extremes of wealth than in most countries. Telephones are more evenly distributed as between urban and rural areas than is generally the case. Sixteen and 22 telephones per 100 of the population for Australia and New Zealand, respectively, place these two countries among the best developed in the world, from a telephone standpoint.

PORTRAIT OF AN INDUSTRY

ARTHUR E. STRINGER

PUBLIC RELATIONS DEPARTMENT, A. T. & T. CO.

PHOTOGRAPHY plays an increasingly important part in business literature of all kinds, as well as in the newspapers and periodicals which Americans are accustomed to find on newsstands and to which they subscribe by the million. In both the industrial and commercial fields, quality has improved as greatly as quantity has increased, and on every hand we observe truly excellent photographs.

This is true throughout the Bell System, of course; and nowhere are finer industrial pictures to be found than in the magazines published by the System companies. Each month their editors use pictures to illustrate the activities of the men and women who work in the telephone business; in the operating telephone companies, in Bell Laboratories, in the Western Electric Com-

pany. These are working pictures, not salon photographs, yet many of them are notable for their beautiful portrayal of the scene each represents.

Last year 131 of these photographs were assembled in what was termed the "Portrait of an Industry." They were selected not so much for their excellence as exhibition prints as because each helps to tell the story of the telephone business and the people who work in it. When shown in New York, they were so favorably received that arrangements are being made to show them elsewhere.

Obviously, the complete exhibit has no place here. But these dozen pages can give some of the flavor of the many photographs which constitute the original "Portrait of an Industry."





THE RIGGERS *Julian Maddox, Atlanta*



HELLO, DADDY *Morris Gordon, New York*

YOUNG ENGINEERS

Rae Russell, New York



CABLE MAKER

Morris Gordon, New York



SERVICE ASSISTANT

Ed Nano, Cleveland





SMELTER

Morris Gordon, New York

OPPOSITE: EARTH AUGER

Jack Brown, Cle

INSTRUMENT MAKER

*Harvey Langee, Murray Hill,
N. J.*







CONSTRUCTION

Bill Shropp, New York

OPPOSITE: ICE

Allan Thompson

INSTALLER

Herb Kratovil, New York







VOICE WITH A SMILE

Stone & Steccati, San Francisco



THE PLAYBACK

Arthur Leipzig, New York



ENGAGED

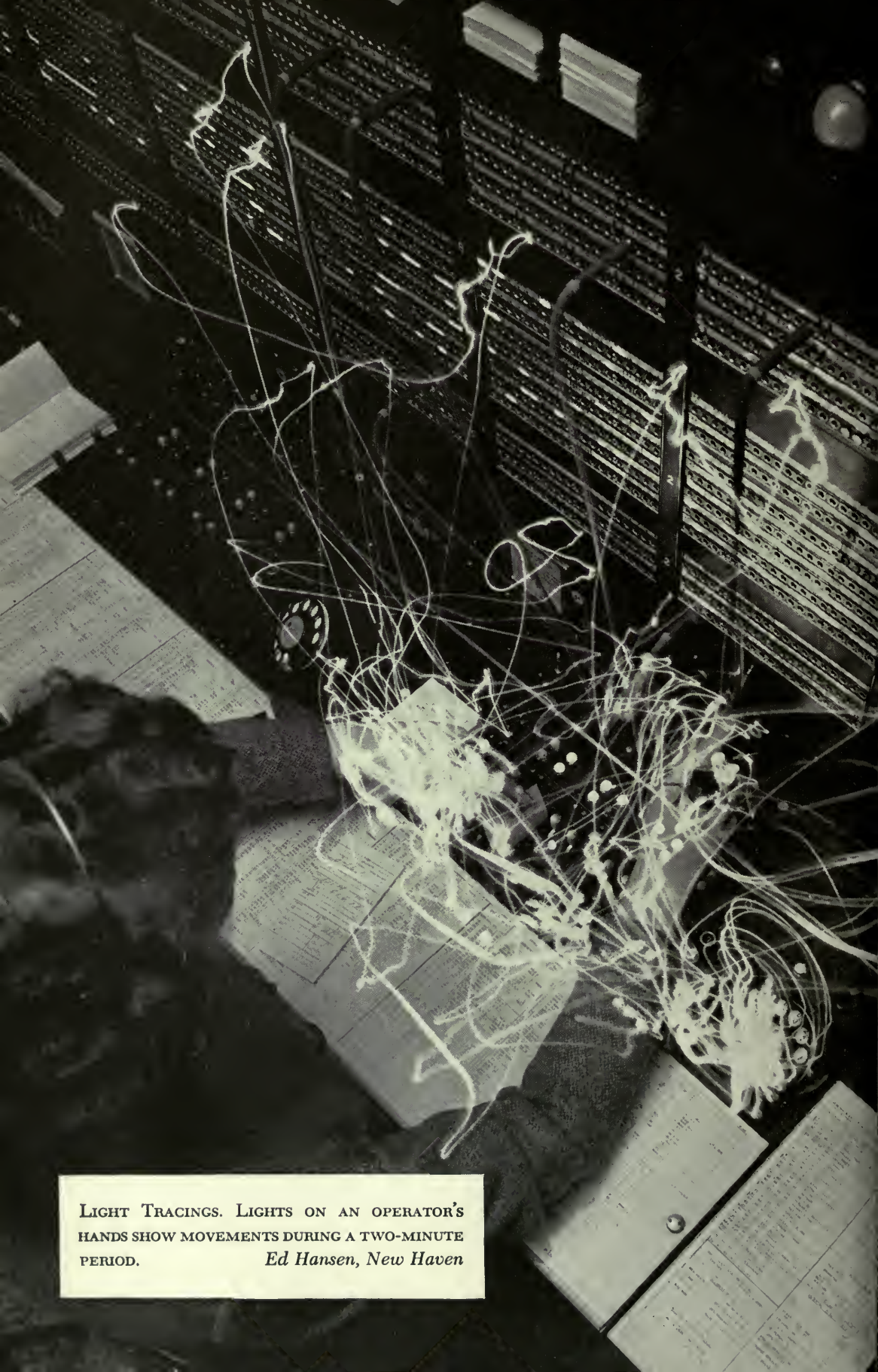
Jack Brown, Cleveland



CRAFTSMAN *Rae Russell, New York*

HOW TO USE THE TELEPHONE *Jack Brown, Cleveland*





LIGHT TRACINGS. LIGHTS ON AN OPERATOR'S
HANDS SHOW MOVEMENTS DURING A TWO-MINUTE
PERIOD.

Ed Hansen, New Haven



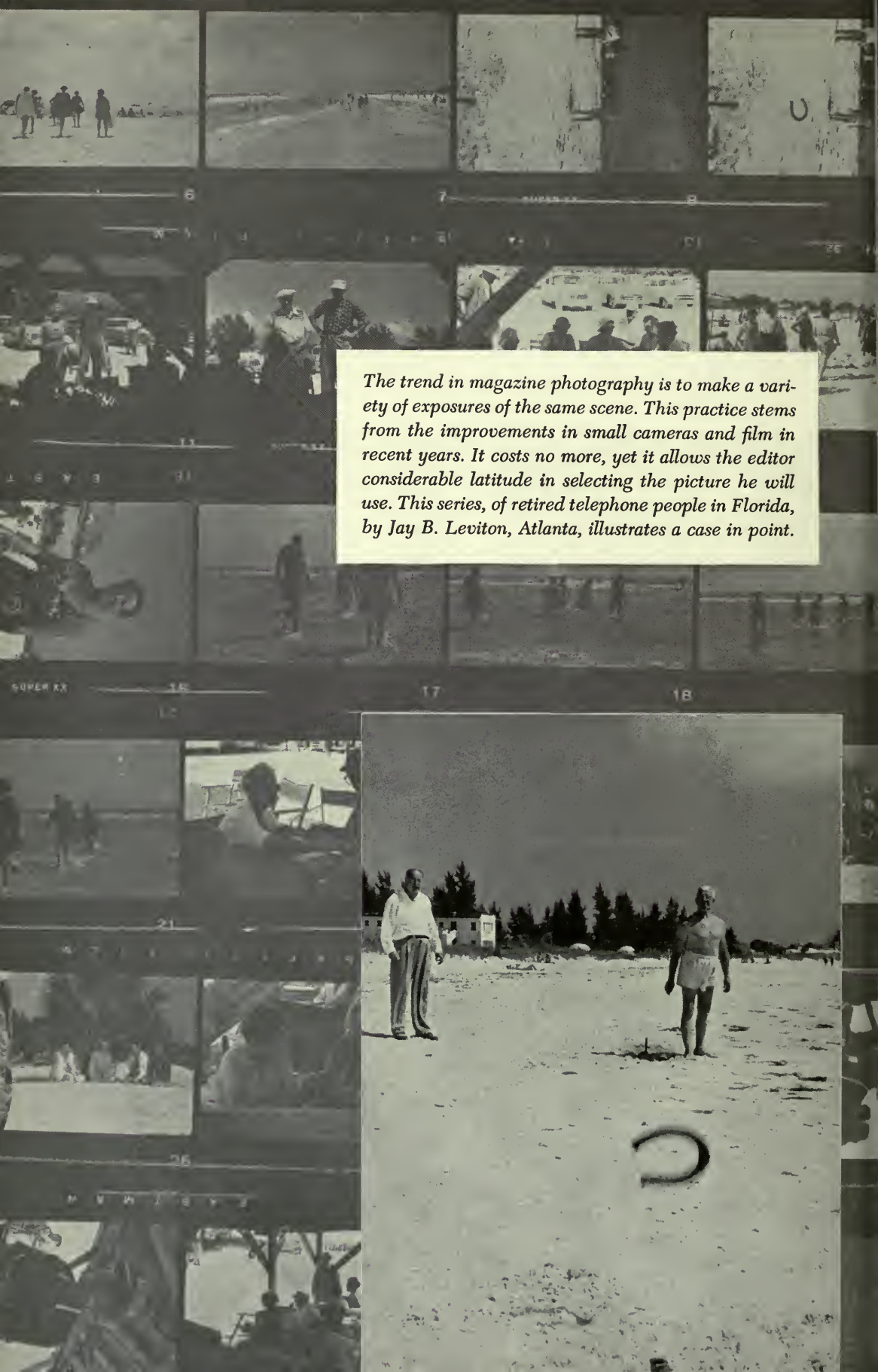
BOWLING SERIES

Nelson Morris, New York

BEDTIME

Jack Brown, Cleveland





The trend in magazine photography is to make a variety of exposures of the same scene. This practice stems from the improvements in small cameras and film in recent years. It costs no more, yet it allows the editor considerable latitude in selecting the picture he will use. This series, of retired telephone people in Florida, by Jay B. Leviton, Atlanta, illustrates a case in point.



*The country's outstanding radio program of fine music
continues to create in the minds of its hearers a tradition
of excellence and a personality of warm friendliness*

"TELEPHONE HOUR" STARTS ITS SIXTEENTH YEAR

WILLIAM E. HAESCHE, JR.

*Radio-Television Advertising Supervisor, PUBLIC RELATIONS
DEPARTMENT, A. T. & T. CO.*

IN THE ONE MINUTE of silence that settles across Carnegie Hall in New York City just before nine o'clock every Monday night, there's a feeling of anticipation which comes only from the knowledge that something wonderful is about to happen.

You can feel it in the hushed tiers of boxes ringing the fabled hall. You can see it in the uplifted faces of the people in the orchestra seats. And, from the letters received, you know that all across the land there are many, many others who have eagerly awaited this particular moment on Monday night.

As the sweep-second hand of the big NBC clock ticks off the seconds before nine, Conductor Donald Voorhees steps to the platform in front of his 57 musicians. He glances at the clock, raises his baton, and fixes his eye on the poised hand of Wallace Magill, the producer, sitting in the control booth off stage.

At the exact instant the second hand reaches the top of its swing, Magill points

the finger of one hand at the conductor, and clicks a stop watch held in the other. Down comes the baton; and twenty violins, six violas, five cellos, four French horns, three basses, three trumpets, three trombones, two clarinets, two flutes, harp, bass clarinet, bassoon, oboe, English horn, tuba, celesta, piano, drums, chimes, timpani blend harmoniously, and the familiar strains of the Bell Waltz are carried over the airwaves once more.

During the half hour that follows, Voorhees and Magill, working in silent coördination through the strange sign language of radio, produce just the right amount of music and words to bring the program down to its closing theme at precisely 29 minutes and 20 seconds past nine o'clock. It is a smooth, flawless operation of perfect timing, the result of years of experience and training.

Voorhees is the master musician, the perfectionist whose every purpose during these minutes is to interpret as truthfully



Outside Carnegie Hall on a Monday evening.

as possible the musical literature as written by the composers. Yet he is limited by the pattern of air time which demands that the words and music always total to the number of minutes purchased by the advertiser: 3.10 minutes of Intermezzo; .05 minutes of applause; .45 minutes of interlude; 3.55 minutes of Ballatella; 2.01 minutes of commercial—etc. His skill in timing is matched only by his coördinate in the control booth. There the producer hardly needs the stop watch to know when an artist is deliberately dragging the notes for dramatic emphasis, or when the applause is too heavy for a tight show.

For 15 years now—ever since April of 1940—the Telephone Hour has been a regular, welcome visitor in countless homes throughout America. Through these years, the program has presented the finest music, superbly played, and the talents of the world's greatest vocalists and instrumentalists. And for 15 years now, the Tele-

phone Hour has been working steadily, week after week, at the highly important job of making friends for the Bell telephone companies.

A SMALL MEASURE of its success in this field are the thousands of letters which have been received from people all over the country and in all walks of life. They say virtually the same thing, in a thousand different ways—"The music is wonderful. The Telephone Hour is one of the finest programs on the air. We are grateful to the telephone company for giving it to us."

A student from Texas writes, for example, to say he awaits tickets to the broadcast so he can plan his entire vacation around the time he will be able to visit the Telephone Hour at Carnegie Hall.

A rancher and his wife write from a desolate point in the hills of Wyoming and state how much they look forward to the program every Monday night. They en-

"Telephone Hour" Starts Its Sixteenth Year

close a snapshot of themselves and a moose posed in front of their mountain cabin.

A telephone company business office supervisor from Ontario says she never accepts an invitation on Monday night because she doesn't want to miss the program. "I even enjoy the commercials," she writes. "They are very interesting and so tastefully presented and full of helpful hints for better telephone service. As an employee of the Bell Telephone Company of Canada, I may be slightly prejudiced," she says, "but I have heard many non-Bell friends say the same thing. When," she adds, "do you people ever have holidays? Your broadcasts seem to go on all year long, year after year."

Many letters are from music students and music teachers, for the Telephone Hour is required listening in numerous music classes throughout the United States. Music teachers and their students, incidentally, are often rapt listeners at Carnegie Hall rehearsals.

One thing about the fan mail is particularly significant and is, perhaps, an important measure of the program's worth. The letters invariably show that the writers are more than just thankful for the entertainment received. Again and again, people write in to say how *deeply grateful* they are to the telephone company for the *kind* of program that it is.

AS THE PROGRAM begins its sixteenth year of broadcasting, it is confronted with the still-growing impact of television as a competitor for its nation-wide audience. In 1946 there were approximately 33,900,000 radio homes and 10,000 TV homes in the country. During the period from 1946 to 1955, the number of radio homes increased by more than 13 million to an estimated

total of 47,500,000, while TV homes increased to a total of 32,000,000.

Television's phenomenal development has had the effect of decreasing the size of radio's audience. During the five-year period from 1950 to 1954, radio sets tuned in from 9:00 to 10:00 P.M. declined 51 per cent, whereas television sets tuned in increased 220 per cent.

Available rating information indicates, that today the Telephone Hour's audience may be just about the same size as it was when it was started in 1940. The program reached its largest audience in 1950, with an average of 2,654,000 families listening per broadcast. It has declined to about 1,539,000 families in 1954. If you consider that the average listening family may consist of two or three persons, then our total listening audience could be estimated at more than 3,800,000 people. And if you look at it over a period of four weeks, the record shows that 3,500,000 different families, or an estimated 8,750,000 individuals, heard one or more of the programs.

Opinions differ as to the accuracy of radio audience measurements, however, because of the tremendous increase in multi-set radio homes, and of automobile and other out-of-home listening. Currently there are about 28,800,000 cars with radios, so if car-radio listening was measured, it would add substantially to the total size of radio audiences. A survey conducted in July 1954 shows that automobile radio listeners may now add as much as 24 per cent to the in-home audience of the average evening half-hour program.

It is interesting to note that the Telephone Hour has resisted the inroads of television better than the average evening once-a-week radio program. In 1950, 18.3 per cent of all radios tuned in during the



Rehearsal: Donald Voorhees, conductor; Wallace Magill, producer; and Jack Green, violinist and orchestra librarian.

9:00 to 9:30 P.M. (EST) period on Mondays were tuned to the Telephone Hour, whereas in 1954, the program's share of audience had increased to 21.6 per cent.

WITH THE BULK of Associated Company advertising now being used to back up their merchandising efforts, it seems important that the Telephone Hour continue with its primary mission of institutional messages: the value of a strong telephone system, the value of good citizenship by telephone people, the value of service and the value of research.

During the past 12 months the Telephone Hour also has done its part to support the merchandising programs, and currently about 40 per cent of the commercials

are devoted to the promotion of long distance, additional telephones, complete service for the home, and other sales items as appropriate.

Over the years, research studies on Telephone Hour commercials have told us that the warm, human, friendly, realistic and personal approach earns us a great deal in increased audience attention, believability, and remembrance of our story. We have learned that our messages are most effective when they describe the values of telephone service in terms of the self-interest of the listener.

The stories heard on the Telephone Hour will continue to reflect a quality which sets them apart from ordinary radio advertising. They will continue to be written in



Soprano Renata Tibaldi with Tom Shirley, who handles the "commercials," and Floyd Mack, the announcer.

terms of people: those who provide the service and those who use it. We know that true stories, documented with the facts of who, when and where, have the most credibility. Flavored with incidents from the communities, wherever possible, our stories identify telephone people by name and telephone users by name and address.

DURING the coming months the Telephone Hour will continue to feature the outstanding artists of our time: to name a few, Lily Pons, José Iturbi, George London, Robert Casadesus, Zino Francescatti, Eileen Farrell, Renata Tebaldi, Brian Sullivan, Michael Rabin, Lucine Amara, Grant Johannesen, and Barbara Gibson. The search for new talent will go on, and newcomers to the Telephone Hour may be ex-

pected to make their debuts during the season. New American music will be reviewed, and the outstanding American composers will have their work presented on the program as well as the fine scores from the masterpieces of the world.

We know from tests made of our programs that there should be a proper balance between "heavy" and "light" music. Several years ago certain moves were made in the direction of lightening the content of the program in order to gain more listening. Our research warned us, however, that it might be possible to go too far in the way of "popularizing" the show and lose our distinctiveness as a fine music program. Today our programs are designed to entertain the majority of listeners rather than those interested only in serious music. At

the same time, we feel we should be uncompromising in our objective of presenting the finest music and the leading artists of our time.

The professional people associated with the Telephone Hour are dedicated to the task of creating the best musical program on the air. Donald Voorhees has been with the program since it started 15 years ago. Many of the musicians in the orchestra have been with it since it was first organized. Wallace Magill has been the show's producer for more than 13 years. Floyd Mack was the original Telephone Hour music commentator and still continues in this role. Tom Shirley, known as the "voice" of the Bell System, has been with the program continuously since the spring of 1942.

SOME TWENTY YEARS before the Telephone Hour began, the Bell System had pioneered in radio broadcasting by launching the experimental Station WEAJ in New York. And then we had gone on to provide the inter-city networks which bring all nationwide radio programs into the American home. So when we started the Telephone Hour in April of 1940, we wanted our program to have the best music and to hold high the entertainment standards that the radio industry was striving to maintain. We also hoped that enjoyment of the program would establish another link between us who provide telephone service and those whom we serve.

An enterprise like the Bell System needs the support of all the people, and this depends on having their confidence and understanding. We need to be thought of as

a progressive business devoted to the public service, a good place to work, and one that will administer wisely the savings of those who invest in it. Of course, to be so thought of, we must truly be that kind of business. We must then also let our aims and our doings be known.

And so, each Monday for 15 years we have told a brief story about something going on in the Bell System—some story that would be in keeping with the program and at the same time would add to the understanding of what we are and what we stand for.

Just as we do with each of our advertising media, we must keep our use of radio advertising under constant review. As it begins its sixteenth year, the Telephone Hour still seems to be doing a good job for all of us in the Bell System.

It is the type of program that creates appreciation, gratitude, and good will—apart from its ability to transmit information through commercial messages. In thousands of homes, listening to the program is still a family ritual, and writers of fan letters show a strong sense of proprietorship. It is probably more effective than most other types of radio programs in reaching community leaders. Its acceptance in schools and by music teachers builds prestige for the Bell System with young people. And it continues to give the Bell System a "voice" and provides elements of friendliness, warmth, and personal contact at a time when growing mechanization makes it more than ever important that those traditional human qualities of our service be made evident at every opportunity.

The Blue Pencil

AN EDITOR reads a lot of things besides those which appear on the pages of his publication. Part of the general requirement of keeping up with the job in all its aspects, of course. Some of the items he encounters are significant, some are interesting, some are enjoyable in one way or another. Among the last are what might be termed editorial coincidences: one topic crossing the path of another related one, so to speak. If this department of unconsidered trifles seems to be more than usually full of quotes from others, it probably means that the paths and byways of coincidence have been bearing unusually heavy traffic this spring.

Take Vice President Miller's article on Merchandising, in this issue, for example. Significant, certainly, for the whole Bell System. And at once comes across the editorial desk an Associated Company employee magazine announcing the appointment of its own vice president in charge of Merchandising, and saying, in a little "aside":

"In the telephone business, we all have a full share of things to look forward to. The year 1955 is hardly under way and already we can tell it's going to be a wonderful year in the telephone business, a year of progress, of moving forward, of new and exciting experiences and adventures. . . . The appointment marked the beginning of a brand-new era in the telephone business, something entirely new in our working lives with the Company. It spells out a 'going forward' for all of us, the end of days when we had to apologize because we couldn't give people what they wanted in the way of service. Now we are launched on an era of bringing more service to more people, of introducing all kinds of new services for their communication needs. . . ."

Those last stimulating words, about service to people, call to mind a wise and telling observation by Dale Carnegie, the "Winning Friends and Influencing People" author. Says he: "Thousands of salesmen are pounding the pavements today, tired, discouraged, and underpaid. Why? Because they are always thinking only of what they want. . . . But you and I are eternally interested in solving our problems. And if a salesman can show us how his services or his merchandise will help us solve our problems, he won't need to sell us.

We'll buy. And a customer likes to feel that he is buying—not being sold."

OR CONSIDER the matter of the Alexander Graham Bell plaque in the lobby of the A. T. & T. headquarters building in New York, which we pictured and described in our most recent issue. Now comes word of the Alexander Graham Bell Memorial Museum, which is being erected near Baddeck, Nova Scotia, as a Canadian National Shrine. All telephone people will like to know that it overlooks a bay on Cape Breton Island, just across from the Bell summer home, Beinn Bhreagh, where, from 1885 until 1922, the inventor experimented in many fields. In his tests of flight he built huge kites made up of a number of cells in the form of tetrahedrons: the tetrahedral motif is in the design of the new museum building.

EVEN HURRICANES, which have loomed large in our last two issues, get into the act—despite the distance this coincidence has been fetched. For in looking up something in Vol. XXIX (1950) of the Magazine, we came across an account of the storm which the Weather Bureau then reported as "the most violent of its kind ever recorded in the northeastern quarter of the United States." And in that account we found again a point—a point of view, perhaps—which seems to us always important and often overlooked. Although the figures apply only to that particular outburst of Nature, we quote the whole passage as of no less significance today:

"THE OTHER SIDE OF THE PICTURE

"Damage is spectacular. Broken poles and tangled wires beside the road bespeak the fury of the storm.

"Restoration is encouraging. Truck convoys rolling to the scene, skilled crews working valiantly to restore service, are a reassuring sight.

"Such things attract attention. They make news.

"But there is another side to the picture: the telephone plant which withstands the storm's assaults, the service which does not falter. Even in an emergency, they are pretty much

taken for granted. And they are by far the larger part.

"Let's look at this in terms of just one hard-hit Area of one telephone company, by way of making the point.

"The storm put 39,000 telephones out of order there. But those telephone were 5.7 per cent of all the telephones in that Area; and, because some people had extension telephones, actually only 5.25 per cent of all customers were affected. Now, that is still a lot of people without service, and it is scant consolation to a man with a useless telephone to know that he is part of a small statistic. But the fact is that close to 95 out of every hundred telephones stayed in service; that for every customer who could not make a call, there were nearly 19 who could.

"Incidentally, of those 39,000 telephones, better than 95 per cent—37,050—were repaired within twenty-four hours.

"About 400 poles in that Area went down. But statistically they were twenty-four one-hundredths of one per cent of all the telephone poles in service there. In other words, about 159,500 poles stood firm against the most violent storm of its kind ever experienced in that part of the country.

"Or take, on the broader stage of the whole storm-stricken territory, the 475 telephone buildings which continued to furnish service despite the failure of their commercial power supply. Had not arrangements been made to overcome just such a situation if ever it should arise, who knows how many times greater might have been the number of telephones out of order, how many communities might have been entirely deprived of service?

"Interruption to telephone service on such a scale is a serious matter. It must not be—and

is not—taken lightly. But this account would be incomplete if it did not point out the brighter side of the picture."

AMONG THE PUBLICATIONS we peruse (editorialese for *look at*) is the *British Post Office Magazine*, which, as most of you know, deals with telephone matters, among others. And there, not long ago, we came across a squib which probably transgresses all Bell System specs and regulations but still brings a wry humor across the sea:

"A trench for cables was being opened when the engineer in charge came along, took a quick look at the work, and cried, 'Hi, this trench is dangerous. Tell the foreman it must be shored up.'

'He knows already,' replied one of the labourers. 'We've nearly got to him!'"

FINALLY we catch up with the coincidence which is illustrated at the bottom of the page; for, while we assert that the figures portrayed are allegorical, there is no denying the identity of the weapon with which the editor is defending himself.

The sketch appeared recently above a column, "The Cerfboard," which is conducted by Bennett Cerf, author and editor, in *This Week Magazine*—and is reproduced here by courtesy of that publication. It was Mr. Cerf—to press on toward our climax—who in his column a few weeks earlier summed up progress toward success in Hollywood in just three sentences:

"I haven't a telephone, but the drug store at the corner will always take a message."

"*Darling*, do call me up. I'm in the book."

"Sorry, but the subscriber has an unlisted number."



HEADQUARTERS SUMMARY

Dec. 15, 1954 to
March 15, 1955

A COMPREHENSIVE REFERENCE MEDIUM, "Notes on Nation-wide Dialing," covering technical information on direct distance (customer) and operator dialing was completed early this year and distributed to the Bell Companies and the USITA.

In addition to technical data required by manufacturing and engineering personnel, the book includes detailed notes regarding the national numbering plan, switching plan for nation-wide dialing, equipment requirements, and transmission and maintenance considerations.

As planning for nation-wide dialing involves the entire telephone industry in the United States and Canada, all telephone companies participating in this project will be interested in these Notes. The Notes will be of value within the Bell System also as an aid in training, as a source of technical information, and as a general reference.

THE LONG RANGE PLANNING COMMITTEE has recommended that information service under direct distance dialing be handled by the user dialing his own long distance operator when he wishes to obtain a number at a point beyond the area served by his local information bureau. The operator, in turn, will connect the user through to the proper information bureau so that he can deal directly with the distant information operator.

Of the several plans studied, this appears to be the best from the user's viewpoint because of its simplicity, its uniformity throughout the nation, and its service potential—since his own operator can offer immediate assistance if the customer so desires. In addition, this plan appears to meet the transitional as well as the ultimate requirements, it requires no equipment changes, and the additional operating costs as compared to a plan where the user dials directly a distant information bureau are relatively small.

OLDER TYPES of telephone sets are being modified to increase their transmission efficiency—the increase being sufficient so that these sets can be used in places where #500 sets have previously been required. An extensive field survey showed that this plan would help to clear up unsatisfactory transmission conditions and to give greater flexibility in the use of sets for both transmission and merchandising activities.

A SAFER climber ("hooks" or "spurs") for use by construction, installation, and repair forces has been made available. The improvements are based on recent tests which indicated that the possibility of a climber cutting out of a pole could be reduced by slightly increasing the angle formed between the gaff and leg iron of the climber.

ANNOUNCEMENT last February of the proposed new A. T. & T. Convertible Debenture issue represented the biggest financial news of the year for the Bell System. After share owner authorization at the Annual Meeting, it is left to the Directors to determine whether or not this type of financing is best adapted to conditions as they exist at the time new capital is needed. The total authorization of \$650,000,000 is sufficient to permit an offer to share owners in the ratio of \$100 of debentures for each eight shares of stock held, if an issue of this approximate size is finally decided upon. If the issue is to be smaller, the ratio would be a somewhat higher multiple.

The last A. T. & T. convertible offer, late in 1953, was for \$602,543,700. At that time the strenuous Treasury job of processing subscriptions and issuing debentures was housed in the remodeled building at 50 Varick Street, New York, where the stock and bond work of the company is now handled and where this year's Annual Meeting of share owners was held. Since this building is no longer available for another processing operation, there will be the difficult problem, assuming such an offer is made, of finding other suitable space for housing as near headquarters as possible the 1,500 or more people who would be involved.

THE BELL SYSTEM FAMILY of share owners has received quite a boost in size through the February final payments on A. T. & T. stock under the Employees' Stock Plan. More than 200,000 System employees completed such payments and received stock in March and April, occasioning the biggest single certificate-issuing job for Treasury people in the post-war period. Since a fair proportion of these employees are new owners, the A. T. & T. stock list has now been increased to a new high of more than 1,350,000. An unusually large number of employees decided to have their shares registered in joint names. As a result, joint holders of A. T. & T. stock presently exceed 380,000—a larger figure than the

total of all share owners of the company at the end of 1925.

THE FIRST INSTALLATION of a new type of antenna—a tapering horn resembling a cornucopia or “horn of plenty”—was made in February atop a radio relay tower near Terrell, Texas, on the Dallas-Jackson microwave route now being built. This unit, named the horn-reflector antenna, can accommodate more channels than the older type because it is designed for simultaneous use with three widely separated bands or groups of wave lengths rather than a single one, and because it handles both vertically and horizontally polarized waves. This not only increases the capacity of the radio system but helps reduce certain types of interference. The new unit is about 20 feet in length, extending from a throat of about 3 inches at the bottom to a width of some 10 feet at the top. Its transmitting and receiving mouth has an area of about 65 square feet and is covered by a plastic material enclosed in a metal frame.

A new type of wave guide to carry the signal between ground level and tower top has also been introduced with the new antenna. It is circular rather than rectangular in cross-section, has more than twice the area of the existing wave guide, and hence makes for less transmission loss.

RADIOTELEPHONE SERVICE between the United States and Ascension Island, a British possession off Africa in the south central Atlantic, was opened on March 15. During World War II, Ascension Island was an important fueling point. With this addition, Bell System overseas service reaches 106 countries and territories.

A NEW portable military telephone system, which can handle three times as many conversations over a single cable as could comparable World War II and Korea systems, has been developed for the U. S. Army Signal Corps by the Laboratories. This system provides for twelve simultaneous conversations, and can be used for distances up to two hundred miles. Another system can be used for four simultaneous conversations at distances up to a hundred miles. Several of these wire systems linked together can form a communication system of about a thousand miles. They may also be operated in conjunction with a military radio relay system developed at Bell Laboratories.

THE BELL SYSTEM, through Bell Telephone Laboratories, is participating in a coöperative wood pole research program being carried out at the United States Forest Products Laboratory under a fund contributed by pole users, suppliers, and treaters. The two-year program is being sponsored by the American Society For Testing Materials, and is directed toward establishment of accurate data on the strength of full-sized poles, improving requirements for specifications, and determining the effect of the accepted preservation processes on the strength of full-sized poles.

THE U. S. AIR FORCE recently announced appointment of the Bell System's manufacturing and supply unit, Western Electric Company, as prime contractor for construction of a Distant Early Warning radar line across the North American continent within the Arctic Circle. In October 1953, Western Electric undertook construction and test operation of the first experimental units of a DEW line in the Barter Island area in Alaska.

The projected DEW-line radar network is designed to furnish warnings to Defense Command Centers in Canada and the U. S. within seconds after unidentified aircraft come into radar range. Unlike World War II radar, which required constant attention of human observers, the specially designed DEW-line equipment has certain automatic features so that far fewer persons are required for its operation than would otherwise be necessary.

PACKAGED in one of the most unique containers ever developed by Western Electric packaging engineers, the first repeater for the trans-Atlantic submarine telephone cable was recently shipped overseas from Western Electric's Hillside shop in New Jersey.

Constructed of aluminum, the package measured 35 feet over all, being a long, slender 10-inch-high box having a 6-foot-high semi-circular structure at each end. The whole thing reminded observers of the rudder assembly of some strange aircraft.

Attached to the repeater, which is encased in the slender part of the container, are stub lengths of cable for splicing into the trans-Atlantic cable itself. The cable stubs are coiled inside the semi-circular structures at either end. Ready for shipping, the package weighs 1250 lbs.

Who's Who & What's What

(Continued from page 3)

Relations Department, with the title of employee information manager and the assignment of programming and coordinating employee information activities. He joined the New York Telephone Company in 1931, and served as representative and as manager in several communities in the Long Island Area until 1944. In that year he moved to the Upstate Area, where he held posts as district manager in Utica and Buffalo until becoming division manager in the latter city in 1949—the office he left to join A. T. & T. three years later. The present is Mr. Cogswell's second contribution to this MAGAZINE. His "Providing Employees with Information They Want" appeared in the issue for Autumn, 1953.

"GEOGRAPHY AND THE WORLD'S TELEPHONES" IS ELIZABETH WRENSHALL'S sixth annual contribution to this MAGAZINE on matters statistical. A teacher in schools abroad before World War II, a translator for censorship authorities during that struggle, and a member of A. T. & T.'s Headquarters group since 1945, she finds her facility with foreign tongues a real asset in gathering and compiling data which she uses in her daily activities.

A CONTRIBUTION to this issue in the form of pictures is a "natural" for ARTHUR E. STRINGER, since he has been responsible for the photographic service of the A. T. & T. Co's Public Relations Department. He joined The Ohio Bell Telephone Company in 1949, and garnered experience as a directory salesman, in the Traffic Department, and in the Public Relations Department before coming to A. T. & T. in 1953. As of May 1, 1955, however, he becomes film dis-



Elizabeth Wrenshall



Arthur E. Stringer

William E. Haesche Jr.



tribution supervisor in the film division of the same department.

HIS ENTHUSIASM for the Telephone Hour has prompted the timely article by WILLIAM E. HAESCHE JR. as that radio program begins its 16th year on the air. A newspaper man before he joined the Southern New England Telephone Company in 1945, Bill handled newspaper assignments in that company's Public Relations Depart-

ment until the summer of 1952, when he joined A. T. & T.'s Public Relations Department as public information supervisor. About a year later he became customer relations supervisor working with the System publication *Current Developments* and with the Public Relations Information Exchange Program. He shifted to the advertising section in August of 1954, and has been associated with radio and television advertising activities since that time.

DREAMS COME TRUE

TELEPHONE STORY HEARD ON THE TELEPHONE HOUR

IN THE BELL SYSTEM headquarters building in New York, there's a new bronze plaque. The plaque, by the eminent sculptor Paulanship, shows Alexander Graham Bell at age 28, when he invented the telephone. It bears these words: "He found the means to speed the spoken word to distant places."

Most of you who are familiar with photographs of Mr. Bell remember him in his later years. It's a little strange to think of him as a young man—yet he was young when he had his great dream of a communications system that would some day enable people in all parts of the world to speak to each other.

Young men and young women have such dreams, and that is why they are so important. There are thousands of young people in the Bell System, learning the business of serving you, or working on ways of improving communications methods and equipment.

Young men, growing up with the telephone company in the field, learning first hand the practical needs of telephone users, young men, growing up with their dreams in the laboratory, combine to insure a steady improvement in your telephone service.

To meet the communications needs of millions of people, telephone men have turned thousands of dreams into real inventions.

Some of these, invented primarily for the telephone, will benefit all mankind. From Bell Laboratories has come the transistor, the tiny device that does most things a vacuum tube will do but is far more rugged and needs much less power.

And from the Laboratories has come the Bell Solar Battery, by which man some day may capture the power of the sun and make it produce useful amounts of electrical energy.

Yet important as are such things as the transistor and the Bell Solar Battery, they are merely the more dramatic in a long list of inventions that have made today's telephone service possible.

The sculptured features of young Mr. Bell remind us that out of the telephone research of today will come not only the telephone communications of the future, but scientific achievements—dreams come true—that will make life better and happier for men and women everywhere.



Again telephone men and women showed in many ways that they have the interests of their communities and neighbors deeply at heart. Thirty-six employees were awarded Theodore N. Vail Medals for noteworthy acts of public service. Many thousands teamed together to meet the challenge of the hurricanes. Emergencies bring out the spirit of service in dramatic fashion, but the desire to serve in a friendly and willing spirit is fundamental in every day's work. Last year the new opportunities to render our customers a more complete service, and to anticipate their wishes, brought new satisfaction to the job.

As the System grows our responsibilities in each community increase accordingly. And as always, they touch each other at many points, for bringing people and communities together is the essence of our service and the way we perform in one place affects performance in all. With this in mind, the companies are working closely together on broad programs of executive development as well as other phases of management and vocational training. The success of the business requires that we do our utmost in the community's behalf; we shall surely gain in that accomplishment as we are able to grow in outlook and stature.

*From the A. T. & T.
Annual Report for 1954*

127
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Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS



Cover: Submarine Telephone Cable Splice
at Sea. Painted for this Magazine.

George Samerjan

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JUDSON S. BRADLEY, *Editor*

SALVATORE J. TAIBBI, *Art Editor*

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Who's Who & What's What

IN THIS ISSUE

"INTERNATIONAL COMMUTER" might be an apt if somewhat dramatic way of describing C. C. DUNCAN in recent months; for his duties anent the transatlantic cable have taken him many times, and often at short notice, to England and to several parts of Canada—as well as to the Mediterranean and the eastern Atlantic for last Spring's tests. More than 25 years—including eight months in the Department of Operation and Engineering of the A. T. & T. Co.—have prepared him to assume the responsibility for building the Bell System's share of the greatest overseas communications enterprise of the century. Joining Long Lines in St. Louis in 1927, he went to Dallas in 1939 as district plant superintendent. In 1945 he returned to St. Louis, where he became division plant superintendent. In 1950 he went to New York as general plant supervisor, and soon was appointed assistant to the general

manager. His eight months with O. & E. were as supply practices engineer in 1951—and it was during this period that he contributed "Conservation of Materials" to this MAGAZINE for Autumn 1951. He then returned to Long Lines as operating staff manager. In November 1953 he was appointed general manager-special projects: a synonym, let us say, for embodying in reality the great vision of the transatlantic cable—and for others too, such as the Seattle-Ketchikan cable, which is on the agenda.

IF THE DISTILLATE of sound judgment and broad experience is wisdom, then the wise words of T. BROOKE PRICE in this issue should be thought-provoking to many in and outside of Bell System legal departments. Mr. Price entered the Bell System employment in 1934, and two years later became vice president and general coun-

C. C. Duncan



sel of the Western Electric Company; but he had been practicing law since 1915 and had been for many years a member of a legal firm which the A. T. & T. Co. had consulted upon occasion for 10 years before his election. He moved from Western Electric to become A. T. & T. general attorney in 1941, and ten years later Mr. Price was made vice president and general counsel.

PLANT SALES ENGINEER since the first of this year, RUDOLPH EKLUND has a wide background of plant experience: wide enough to include service in Minnesota, Missouri, Arkansas and Texas with the Southwestern and Northwestern Bell Telephone Companies. He came to A. T. & T.'s O. and E. Department in May of 1954 from the Kansas Area of Southwestern, where he had been general plant manager. Until his present appointment to coordinate plant merchandising activities, he had been



T. Brooke Price

rural service engineer, and he will continue to assist the operating companies in improving and extending rural telephone service.

THE PACIFIC COAST is home territory to ROBERT G. ELLIOTT, who broke away from it only last year to become assistant chief engineer in the O. & E. Department of the A. T. & T. Co. With the Pacific Telephone and Telegraph Company since 1928, he started as a student in Seattle and held various plant and engineering jobs in the Washington-Idaho Area until 1947, when he became plant extension engineer there. In 1950 he moved to San Francisco as general program engineer, and in 1951 he became plant extension engineer of the Southern California Area. Two years later he was made chief engineer there—which was the post he left to make the long stride to New York.

(Continued on page 140)



Rudolph Eklund



Cable goes aboard H. M. T. S. MONARCH at the Simplex Wire and Cable Company plant at Portsmouth, N. H.

*This century's greatest overseas communications enterprise
has international flavor as Great Britain, Canada, and
the United States coöperate in vast undertaking*

TRANSATLANTIC TELEPHONE CABLE PUTS OUT TO SEA

C. C. DUNCAN

General Manager, Special Projects, LONG LINES

DEPARTMENT, A. T. & T. CO.

EARLY ON THE MORNING of last June 28 the cable ship *Monarch* slowly steamed through the Northwest arm of Trinity Bay, leaving behind the village of Clarenville, Newfoundland. Nevertheless, she was still connected with the new cable station at Clarenville—by the cable being payed out at increasing speed as she steamed into the Atlantic.

Cable ships have been terminating transatlantic cables in Trinity Bay for almost a hundred years, ever since the "Great Eastern" laid the first successful transatlantic *telegraph* cable; but this new cable was different. For it was the first transatlantic *telephone* cable. When it is completed, speech will be transmitted across the Atlantic by cable for the first time. So this was a big day for telephone people on both sides of the Atlantic. They had dreamed about such a development since the telephone was invented, and for more than 30 years have actually worked towards this modern miracle of communication.

The conception of this daring project originated with Dr. Oliver E. Buckley, President of the Bell Telephone Laboratories from 1940 to 1951, who in 1919 headed a small group investigating problems of deep-water cable technology. At first they worked on short lengths of telephone cables in medium depths of water, but ultimately they learned more and more about what was involved in bridging vast expanses of deep water. As the study progressed, a whole new technology was brought to the fore while an array of synthetic and natural conducting, insulating, and protective materials was examined. By the late 1920's plans were actually made for a cable across the North Atlantic, but various factors caused the project to be set aside. Nonetheless, Dr. Buckley kept a small force working against the day when this dream could be realized.

Meanwhile, in 1927 transatlantic telephone service was opened by employing radio circuits. Over the years it has in-

creased tremendously in scope and usage and has become an international success. However, this service has been subject to two important limitations: one, the crowded radio spectrum which limits the number of circuits that can be provided; the other, the periodic magnetic storms which impair the transmission of radio waves, particularly over the North Atlantic. During the past quarter century, for instance, three periods of severe atmospheric disturbance have affected the transatlantic service. (The most recent, which started in 1950, is subsiding.) Thus the shortage of radio frequencies and the magnetic storms affecting radio circuits have pointed to the need for a telephone cable to handle the growing volume of transatlantic telephone calls.

To solve the many problems that would be encountered in making such a cable system, Bell System engineers continued their search for techniques, apparatus, and material which would minimize the hazards of laying, operating, and maintaining a deep-sea telephone cable. This led to the design of an electronic vacuum tube that would survive on the ocean bottom for more than twenty years, terminal equipment to feed power out over the cable to these tubes, and the creation of an ingenious flexible amplifier or repeater that could be incorporated into the cable and laid as an integral part of the long underwater coaxial pathway. As the prototype of the transatlantic-cable-to-be, the cable laid in 1950 between Key West, Florida, and Havana, Cuba, embodied all these features, and its performance was followed with the greatest interest.

Such was the success of this cable that, early in 1952, President Cleo F. Craig of the American Telephone and Telegraph Company appointed a committee to report

upon the feasibility of a transatlantic telephone cable. Its members were Vice President George L. Best, Chairman; Vice Presidents Frederick R. Kappel * and Henry T. Killingsworth of the A. T. and T. Company; and Dr. M. J. Kelly, President of the Bell Telephone Laboratories. (In January 1954 A. T. and T. Company Vice President Eugene J. McNeely became a member of the committee when he assumed charge of the Operation and Engineering Department.)

In reporting favorably on the project by May of 1952, the Committee suggested early discussions with officials of the British Post Office, which furnishes telephone service in the United Kingdom. The United States government officials who were consulted heartily endorsed the cable proposal.

The Project Gets Under Way

IN AUGUST 1952, Mr. Best and William G. Thompson, Assistant Vice President of the A. T. and T. Company, went to London for a prearranged exploratory discussion with British Post Office officials. They were warmly received by Earl De La Warr, then Postmaster-General; Sir Alexander Little, Director General of the Post Office; Sir Ben Barnett, Deputy Director General; and their associates. The ensuing discussions served to lay a broad foundation for the project, which, it was learned, had for some time been in the minds of Lord De La Warr and other British Post Office officials. Dr. Kelly, who had been on the Continent, joined in these London talks before their conclusion.

In view of the favorable prospects afforded by these initial discussions, an approach was then made to the Canadian government, which welcomed the opportunity to participate in the venture. Follow-

* Now President of Western Electric Company.



President Cleo F. Craig of the A. T. and T. Company signs the agreement with Great Britain and Canada to launch the first transatlantic telephone cable. Looking on is Assistant Vice President William G. Thompson, who is also President of the Eastern Telephone and Telegraph Company —A. T. & T. subsidiary which will furnish the facilities passing through Canada.

ing an initial consideration by Lionel Chevrier, Minister of Transport, and J. C. Lessard, Deputy Minister, Canada was represented in subsequent negotiation by Douglas F. Bowie, President of the Canadian Overseas Telecommunication Corporation, the governmental agency for overseas communications.

The types of facilities to be used were left for the technical organizations of the British Post Office and the Bell Telephone Laboratories to consider and agree upon. During November and December, 1952, a committee headed by Dr. Kelly and Dr. W. G. Radley—then Engineer-in-Chief of the B. P. O. and now Sir Gordon Radley, Deputy Director General—studied these mat-

ters and made its recommendation. This report advised using a cable system of Bell Laboratories' design between Scotland and Newfoundland, and one of British design in the shallower waters between Newfoundland and Nova Scotia. A further recommendation proposed that the link between the United States and the Nova Scotia cable terminal be a radio relay system. These suggestions were subsequently concurred in by the Canadian participants.

During 1953 several meetings were held in London, New York, and Ottawa at which the British, Americans, and Canadians negotiated matters relating to ownership, manufacture, cable-laying, operation, and maintenance of the proposed cable system.

Signing the Contracts

Earl De La Warr, then British Post-Master General, signs the contract for Great Britain. From left to right are American Ambassador Winthrop Aldrich, Sir Clement Hallam, Solicitor to the General Post Office, Lord De La Warr, Frederick Hudd, Deputy High Commissioner for Canada, and, in the rear, Mrs. D. E. Mitchell.



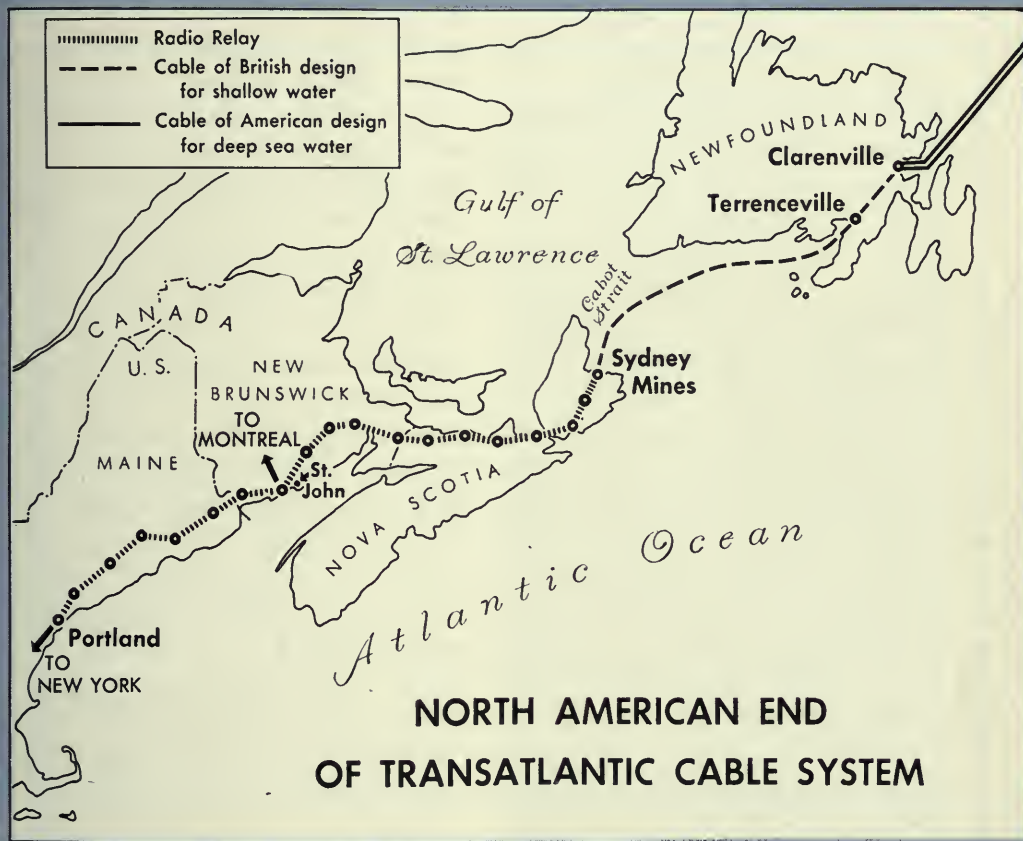
President Douglas F. Bowie of the Canadian Overseas Communications Corporation affixes his signature to the contract as Secretary-Treasurer. R. J. Cassidy looks on.



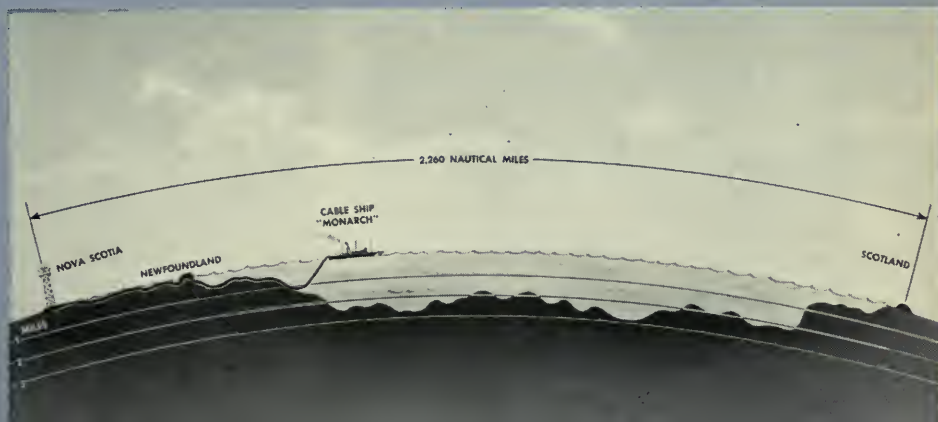
C. C. Duncan, in his capacity as general manager of Eastern Telephone and Telegraph Company, contracts with Clifford W. Smith, sales manager of Western Electric, for equipment and material. Standing are (l. to r.) Stimpson Hubbard, Western's commercial relations manager, Stirling Jack, manager of Eastern, and Norman R. Frame, Secretary of Western Electric.



Route of the transatlantic telephone cable system between Portland and Oban.



Profile of the ocean bottom on which the cable will rest.



The basic responsibilities and rights of each of the parties in the joint undertaking were finally set forth in a contract dated November 27, 1953.

The signing of this agreement involved an interesting procedure. The Privy Council of Canada approved the agreement in Montreal on November 26, 1953. In New York the following day officials of the A. T. and T. Company and the Eastern Telephone and Telegraph Company (a Canadian subsidiary of the A. T. and T. Company which will provide, own, and operate that Company's part of the cable system in Canadian territory), signed an original contract. At the same time, officials of the Canadian Overseas Telecommunication Corporation signed an original contract in Montreal, and in London the Postmaster General of Great Britain affixed his signature to another original.

The ceremony was not concluded until all four originals, carried by couriers flying between the three countries, had their full complement of signatures. This was completed by December 1, 1953, when public announcements were made about the cable project. With that event, task forces in three countries began turning the dream of yesterday into the actuality of tomorrow.

IN ESSENCE, the international project thus set in motion involves two separate one-way cables, laid some 20 miles apart, between Oban, Scotland, and Clarenville, Newfoundland. They will have a capacity of 36 telephone channels. In each cable, voices traveling under the Atlantic for more than 1,900 nautical miles * will be sped on their way by 52 one-way repeaters. (Thus, there will be a total of 104 amplifiers in the transatlantic link.) In Scotland, connection

will be made to London over the British long distance telephone trunk network.

At Clarenville, connections will be made to a British-designed two-way submarine cable extending 330 nautical miles to Sydney Mines, Nova Scotia. This cable will be equipped with 16 repeaters. For a few miles down the coast from Clarenville this section of the voiceway is under water. Then, as a land cable, it will go 50 miles overland across the rugged, rocky hills of Newfoundland, through swamps, lakes, and arms of the sea. Next, as a submarine cable again, it will enter the sea at Terrenceville, at the head of Fortune Bay, and cross the mouth of the St. Lawrence river, called Cabot Strait, between Newfoundland and Sydney Mines, Nova Scotia.

From Sydney Mines the telephone circuits will be carried 575 miles over a new radio relay system to Portland, Maine, where the United States circuits will be connected to the Bell System circuit network. The Canadian circuits will break out of the Sydney Mines-Portland radio relay system near St. John, New Brunswick, where connections will be made with facilities to Montreal.

Immediately after the signing of the agreement to build this cable, the British, Canadian, and American technical staffs started the first of a series of meetings to determine how to convert the over-all design into an operating system. They found that the job of combining the varying types of telephone plant of their individual countries into an integrated system involved many problems. They learned, for example, that some of the very words they had used all of their lives have different meanings in the different English-speaking countries. However, the good humor and spirit of coöperation which were keynotes of these

* A nautical mile is approximately 6080 feet.

and all subsequent meetings helped in solving the many difficulties involved.

What are some of the technical problems and achievements inherent in this undersea newcomer? The answer is found in considering several topics: Cable Manufacture . . . Repeaters . . . Power Equipment . . . Cable Laying . . . and the facilities involved in the 1000-mile approach on this side of the Atlantic. Let us consider them in order.

Cable Manufacture

AT PRESENT the longest deep-sea submarine telephone cable with repeaters is the Key West-Havana link, opened in 1950. About 125 miles long, it is laid in water about one mile deep and has a total of six submerged repeaters.

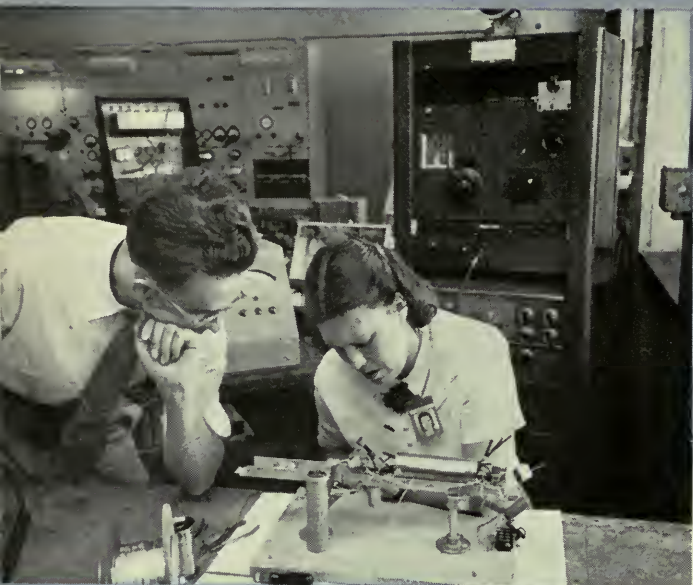
A submarine telephone cable in shallow water between Aberdeen, Scotland, and Bergen, Norway, was laid in October, 1954, by the British Post Office. About 300 miles long, it contains seven repeaters, and is laid in water less than one-quarter of a mile deep.

Thus a tremendous forward step is represented by the pair of telephone cables to be laid under the North Atlantic to depths of about two and one-half miles—cables about 1950 miles long and containing 52 repeaters each. While the design of this deep-sea cable is similar to that of the Key West-Havana cable, the greater length, greater depth of submersion, and larger number of telephone circuits to be derived requires the transatlantic cable to be manufactured to much closer tolerances than previously needed.

The central conductor of the transatlantic cable is made up of a solid wire over which three copper tapes are wrapped. A thick layer of crack-resistant polyethylene plastic insulation of a special type is extruded over this conductor. And to com-



Long-life vacuum tubes, demonstrated at the Bell Telephone Laboratories, are basic to the transatlantic telephone cable project.



At Bell Telephone Laboratories, specialists discuss tests on a laboratory model of one of the networks for the repeater.

Here a laboratory model of the repeater is being tested. There will be 104 of these repeaters in the two one-way cables.



A perfect watertight joint in a section of the cable undergoes examination. Between Scotland and Newfoundland the cable will be laid at depths of up to 2½ miles.

At Western Electric's Hillside repeater shop, this area is slightly pressurized, to prevent the entrance of dust or lint.



An inspector scrutinizes a finished network section under a binocular microscope to detect even the most minute imperfections.

Below: Finished repeaters, with cable leads at each end, are tested at up to ocean pressures in these long cylinders.



Finished repeaters from the Hillside shop were flown to England—each protected in this odd-shaped case—for incorporation in the cable which was laid during last Spring's tests off Africa.



plete the electrical transmission path, a return conductor consisting of spiraling copper tapes is laid over the polyethylene core. Then comes a series of protection tapes—thin copper to guard against a marine worm called teredo, which is fond of eating cables; a fabric tape; a layer of jute; and then armor wires. These wires are themselves protected by a galvanized coating and a fabric cover of tape or braid impregnated with an asphalt compound. Finally, for additional protection, a double layer of jute covers the armor wires.

The amount of armor depends on the depth of water and possibilities of damage from ships' anchors, ice floes, etc. In the greatest depths, which range from one-half mile to two and one-half miles, steel armor wires of great strength are used to withstand the strain of laying or picking up the cable. Here it weighs one and one-half pounds per foot of length and is about one and one-quarter inches in diameter.

However, near the shore, where there is possibility of damage from ships' anchors, much heavier armor wire is used. In this section the diameter of the cable increases to almost two inches and its weight to about four pounds per foot.

In a short section off the coast of Nova Scotia, where icebergs may ground on the cable, a second layer of heavy armor wire is added. This brings the diameter to about

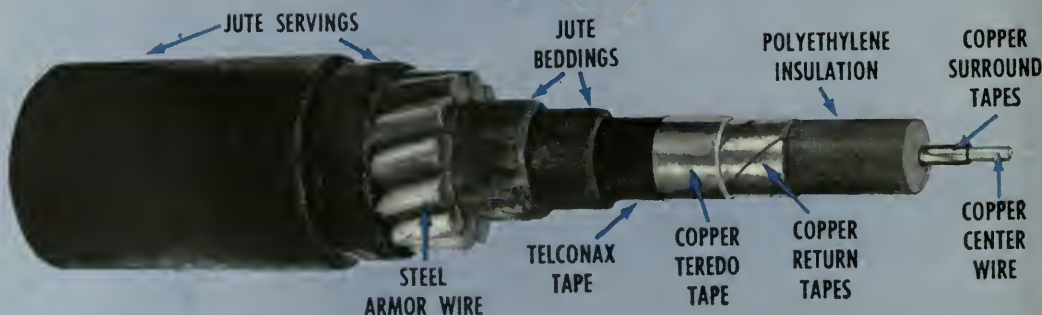
three inches and the weight to ten pounds per foot.

To many, it at first seems strange that the thinnest, lightest cable is used at great depths while the heavier armoring is needed near shore—but experience has shown that the greatest protection is needed in the shallowest water.

Although the design of this cable, particularly the armoring described above, is based on experience with deep-sea cables over many years, it is unique in many respects and requires new manufacturing techniques to meet the close tolerances required. New equipment developed to meet these exacting specifications includes an ingenious combination of a photoelectric cell, to measure the diameter of the polyethylene insulated cable core as it is extruded, and a "capacitance monitor" that continuously measures an electrical characteristic of the cable core as it is being made. An "electronic brain" takes these two factors into consideration and controls the speed of the extruder so as to make perfect core continuously.

Ever since it collaborated with the Western Electric Company to manufacture nine miles of submarine cable for use in Michigan 50 years ago, the Simplex Wire and Cable Company of Cambridge, Mass., and Portsmouth, N. H., has on occasion aided in Bell System projects. Simplex manufac-

Composition of the type of cable used in shallow water.



tured the deep-sea cable placed in 1950 between Key West and Havana. Simplex is also participating in this new undertaking by manufacturing that portion of the transatlantic cable produced on these shores.

On the other side of the Atlantic, these new ideas are being put into operation by the oldest submarine cable manufacturing company in the world. Submarine Cables, Ltd., whose forerunners made the first submarine cable over 100 years ago and the first transatlantic telegraph cables shortly thereafter, has manufactured most of the submarine cables in the world today. And with its large production capacity, it will manufacture most of the present transatlantic cable.

In the industrial village of Erith, not far down the Thames from London, a new plant has been built by Submarine Cables, Ltd., especially to manufacture its share of the transatlantic telephone cable. It is to this plant that the repeaters made in the United States by the Western Electric Company are flown, in specially constructed and cushioned aluminum cases, for insertion into the cable being made there. Here, as at Simplex's plant at Portsmouth, N. H., a team composed of British Post Office, Submarine Cables, and Bell System engineers and technicians is working to combine the new techniques with years of experience in cable-making.

The Repeater

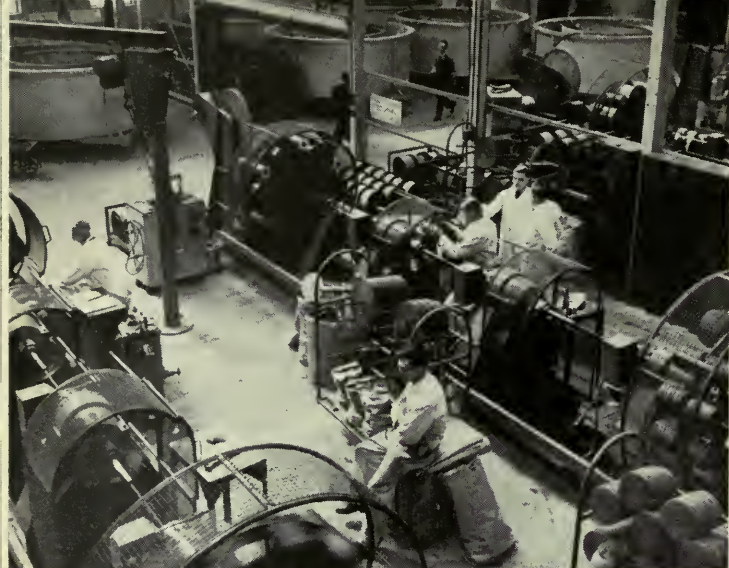
FOR MORE THAN fourteen years, engineers at the Bell Telephone Laboratories have made frequent checks upon a group of very specially designed electron tubes that have been operating continuously over that period. These tubes and their long performance are fundamental to the deep-sea portion of the transatlantic cable project.

For because of their long survival, and Bell System experience with similar tubes in the waters between Florida and Cuba, it is confidently believed that tubes of like design in each of the repeaters will provide amplification over the Atlantic span for at least 20 years without attention.

In addition to many other components, each repeater in the Scotland-Newfoundland part of the cable includes three electron tubes manufactured by the Bell Laboratories. These tubes, which receive power from very accurately regulated current sent over the cable itself, operate in three stages—that is, each tube boosts the incoming signal and then passes it along to the next tube. In this process each repeater amplifies the power of the weakened incoming signal some 1,000,000 times.

These tubes are an integral part of a repeater unique because of its shape and construction and the precision and stability of its characteristics. In order to pass over the drum of the cable-laying ship, the repeater has a flexible housing. The center portion of the structure, which is just a bulge in the cable, is almost eight feet long and a little less than three inches in diameter. From this section, the repeater tapers until it is reduced to the diameter of the deep-sea portion of the cable—one and one-quarter inches.

To obtain the necessary flexibility, the nearly 60 components in each repeater are mounted in a series of 17 linked lucite cylinders. These cylinders are surrounded by two layers of steel rings, the rings in each layer overlapping the joints in the other layer. Finely machined, they provide the strength necessary to withstand sea-bottom pressure of about 6,000 pounds per square inch. A cylinder about eight feet long—of copper made to rigid specifications as a protection against any undesirable ef-

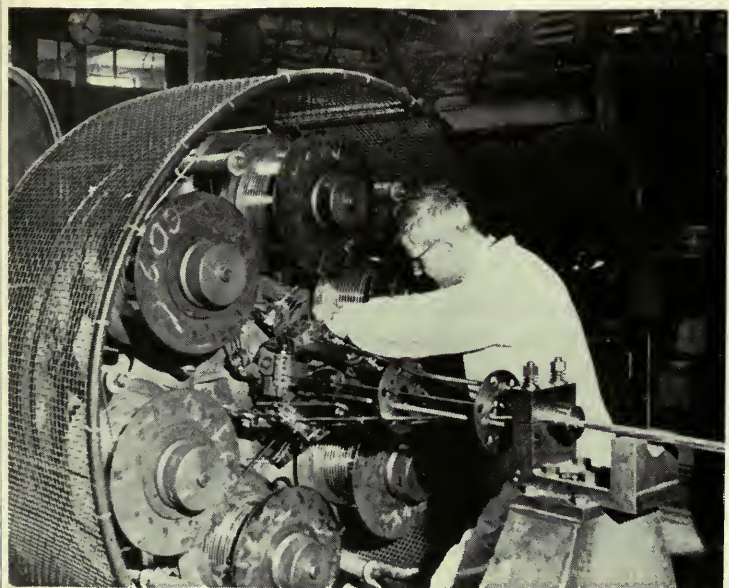


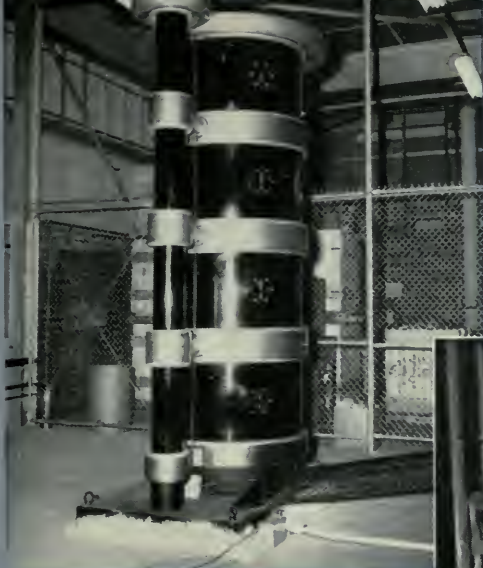
IN THE ERITH WORKS OF
SUBMARINE CABLES, LTD.

Top: Return taping machines.

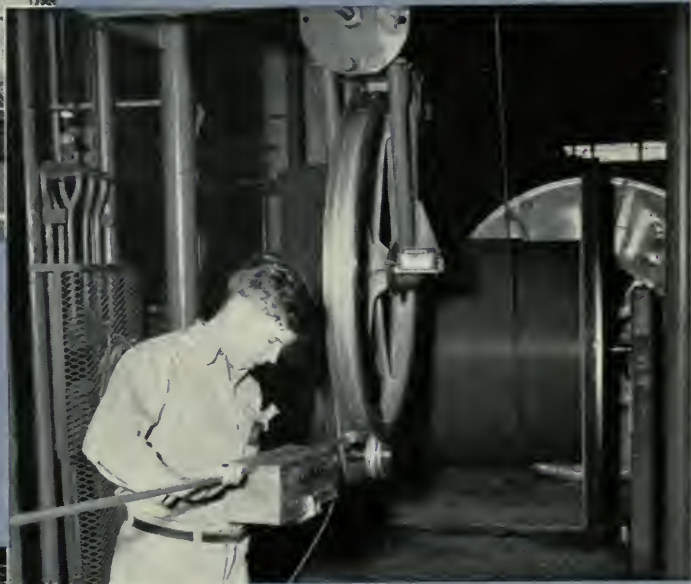
*Center: Application of return
tapes.*

*Bottom: Two lines of extruders
applying polyethylene insula-
tion to the conductors.*





At Simplex Wire and Cable Company at Portsmouth, N. H., this high-voltage testing equipment applies 90,000-100,000 volts to lengths of insulated conductors.

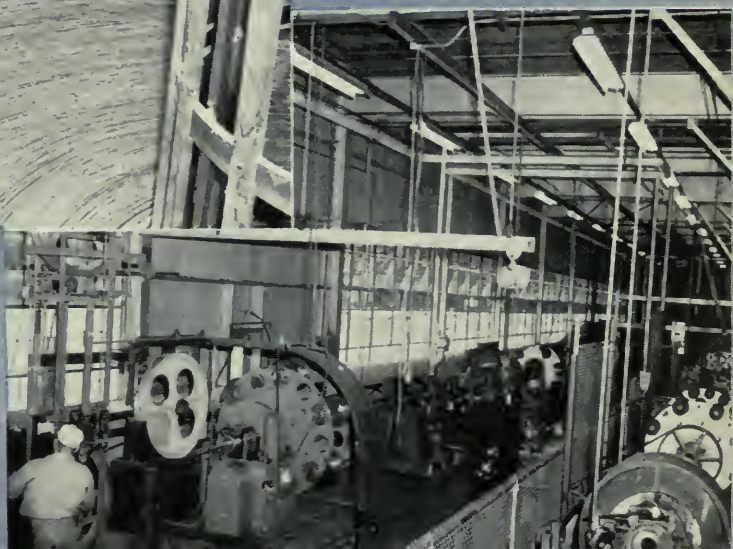


Inspecting cable.



Miles of armored cable are coiled in receptacles such as these.

These machines are applying armor wire to the cable for protection.



fects from the action of salt water—is placed over the steel rings, and then protected by layers of jute and armoring wires. At each of its ends the repeater enclosure is equipped with a system of water-tight seals. The whole structure—including its central protuberance, tapering ends, and final leads—actually makes a complete unit about eighty feet long.

In Hillside, N. J., Western Electric has constructed a factory especially designed to fabricate components and assemble the repeaters for the cable link between Newfoundland and Scotland. This air-purified, temperature-controlled plant might be compared to a clinical laboratory. In order to prevent the entrance of outside dust, lint, or moisture, these quarters are kept under slight air pressure, so that air leaks out rather than flows in. The 250 men and women busy there day and night are probably the most curious looking of all the cable task forces on both sides of the Atlantic—rows of white-capped men and women immaculately clad in white smocks, performing minute mechanical operations or peering through binocular microscopes.

In another part of this unusual looking plant, men are giving the repeater seals helium leak tests in a pressure chamber surrounded with boiler plate. Still others are testing repeaters for leaks with radio-isotopes and checking the results with geiger counters behind lead walls.

With the exception of the electron tubes, which come from the Bell Laboratories, all the repeater components are manufactured by Western Electric. The specifications for the raw materials used are so rigid that only the top-rated suppliers of the nation can qualify to serve the project. In the case of the copper tube casing that keeps sea water out of the repeater, for example, exhaustive tests reduce the amount of cop-

per tubing selected to two per cent of all the high quality tubing tested.

Quartz crystals, which must be capable of frequency vibrations accurate to plus or minus 10 cycles within 170,000, are being ground and tested by another Western Electric force at Kearny, N. J. They are then placed within the repeaters at Hillside. Upon assembly and careful final testing, the repeaters are next transported to the Simplex Cable plant near Portsmouth, N. H. Simplex envelopes these repeaters with the same armor used for the cable—work which must be done without producing critical strain, shock, or other damage to their components.

ACROSS THE ATLANTIC, in the Woolwich Works of Standard Telephones and Cables, Ltd., a totally different type of submarine telephone repeater is being assembled from precision-built parts for the cable to cross Cabot Strait. Over the years, British engineers have concentrated on their own immediate repeater problem—the design and installation of repeatered telephone cables between the British Isles and the European continent. Since the English Channel and the North Sea are relatively shallow—about 200 feet as compared with the two and one-half mile depths found in mid-Atlantic—British experience has been chiefly with repeaters designed for use in relatively shallow waters. Thus it is their repeaters which will be used in that portion of the cable system threading the shallow waters between Nova Scotia and Newfoundland.

These British repeaters are housed in a torpedo-like steel case, nine feet long and ten and one-half inches in diameter, similar to the ones the British recently installed in a new cable between Aberdeen and Bergen. Here, too, the utmost precautions are

The Transatlantic Telephone Cable

used in their manufacture. At Woolwich, incidentally, the workers, who are also dressed in white uniforms, have nicknamed their clinic-like plant "the dairy."

The electron tubes—or "valves," as they say in England—to be used in these repeaters are manufactured at the research station of the British Post Office at Dollis Hill, on the outskirts of London. Although separated by an ocean, the research men of both nations have worked together, exchanging ideas and experiences, and they have visited each others' laboratories as well. Now they are reaching the end of a task which has lasted many years in actuality and many more in imagination.

Terminal Equipment

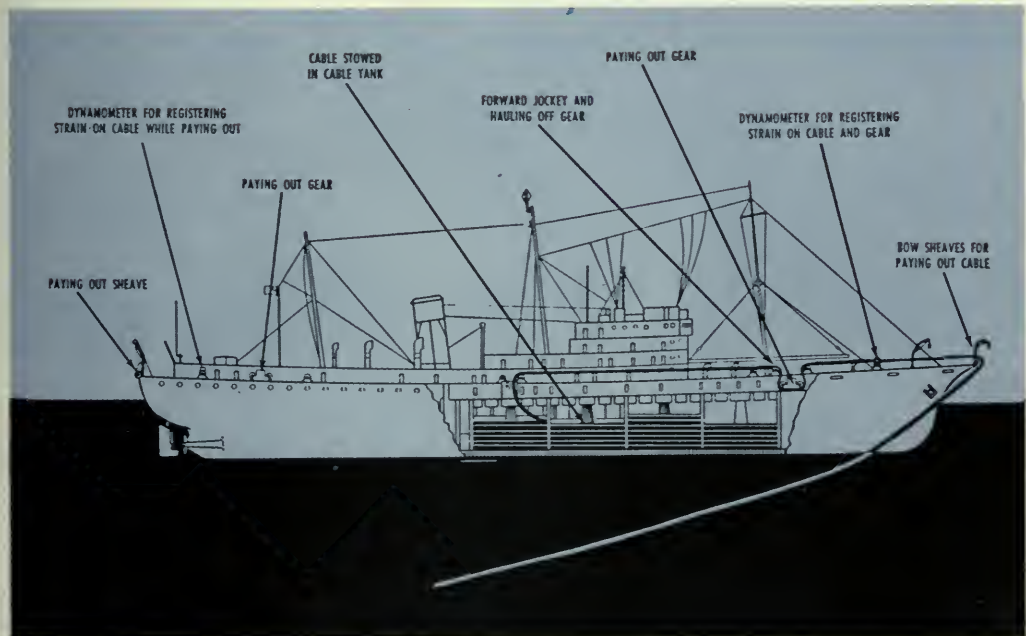
AT EACH END of the twin cables, which together make the conversation path across the North Atlantic, 2,000 volts are fed into both cables—negative and positive potentials totaling 4,000 volts. This power sys-

tem has been especially designed to feed the correct amount of current to the repeaters under the sea, even under abnormal conditions when magnetic storms may cause currents to be induced in the cable by variations in the earth's magnetic field.

In addition to the power feeding equipment, terminal equipment is provided to separate the individual circuits and for testing. Much of the apparatus for the Oban-Clarenville cable has been especially built by Western Electric for this job. Similar special equipment for the Clarenville-Sydney Mines link is being provided by British manufacturers. Insofar as possible, the standard equipment used in Canada is provided by the Northern Electric Company and other Canadian manufacturers.

In Oban, primary power is obtainable from outside sources, but automatic standby equipment is also available at the terminal. However, at Clarenville only part of the required power is now obtainable

Cut-away drawing of H. M. T. S. MONARCH, showing cable tanks and equipment for paying out cable over either bow or stern.





An international conference aboard H. M. T. S. Monarch on modifying the cable-laying machinery for laying the flexible re-



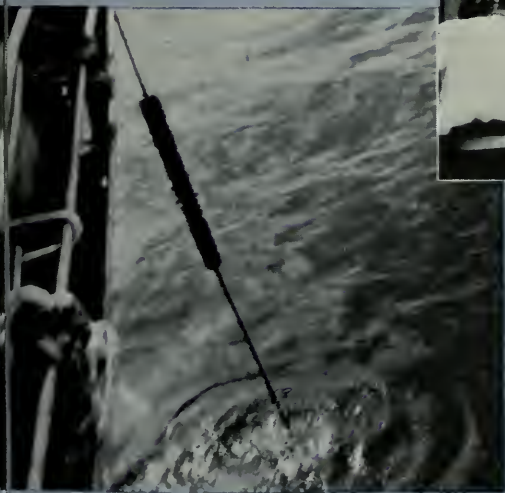
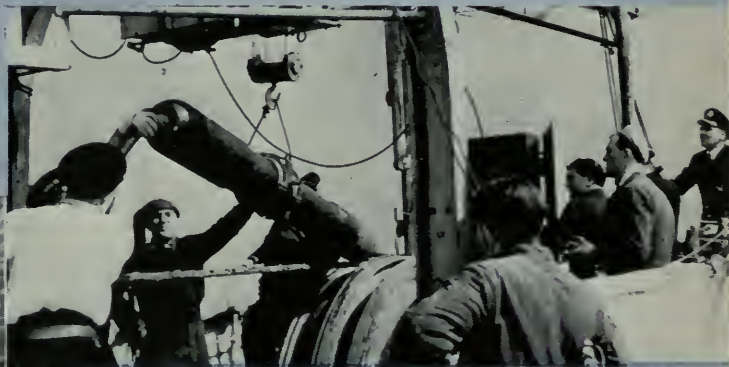
peaters: Present are representatives of the Bell System and the British Post Office and members of the ship's company



Sheaves over which the cable passes as it moves along toward the bow, and (left) the brake drum which is an element of the laying gear.



Forward deck of the Monarch. Similar equipment is located on the after deck for paying out cable in deep water.



Above: A British rigid repeater goes over the bow sheaves and (left) to its resting place on the bottom.

from commercial sources. This terminal therefore houses two diesel engines to manufacture power. These will operate in rotation, to permit periodic maintenance work on them. In addition, so that there will be no cut-off of vitally needed power, an automatic standby engine will also be available.

The radio relay stations in Canada and the United States receive their power from commercial sources, but they too have the standby equipment customary in all stations of this type.

Cable-laying

THE YEARS of experiment and development . . . the work of negotiation and routing . . . the manufacture of cable, repeaters, and special associated equipment—all of these activities culminate in the exacting and complicated task of cable-laying, a task under way as the reader follows these lines. To lay the transatlantic telephone cable, the largest cable ship afloat—*H.M. T.S. Monarch*, 480 feet long, which has a capacity of 8,050 gross tons—has been refitted at the Telcon Works, up the Thames from Greenwich, near the Isle of Dogs. Incidentally, the “Great Eastern,” the famous ship which laid the transatlantic telegraph cable of 1866, the first to be successful, was built at the Isle of Dogs.

When she was completed, nine years ago, the *Monarch* was equipped with all the latest devices for placing submarine cable. However, the new flexible repeaters required a modification of her equipment for the present job. As these repeaters would be damaged if they were bent around a drum less than seven feet in diameter, practically every part of the original cable-laying machinery had to be replaced. Some of the new machinery involves the first fundamental changes in the design of

such gear since the days of the “Great Eastern.” These new designs have been carefully worked out by engineers of the Bell System, British Post Office, and Telegraph Construction and Maintenance Company in order to combine the experience of years of cable-laying and the requirements of these new repeaters.

In mid-March a dress rehearsal of the summer’s big job got under way in the relatively shallow waters of the Bay of Cadiz, near Gibraltar, and later in the deeper waters off Africa, west of Casablanca. Some 45 miles of cable, containing four of the flexible and one of the rigid repeaters, were payed out from the *Monarch* as experts from both sides of the Atlantic watched the result. The ship’s bow machinery was used in the test off Gibraltar, while the stern apparatus was utilized in letting the cable down to the two and one-half mile bottom off Africa. Motion pictures were taken of the cable coming out of the tanks below decks, passing around the drums and through the cable-placing machinery. The whole process was carefully studied so that anything which could prevent a perfect performance this summer would be anticipated and corrected.

The *Monarch* next steamed off into the Atlantic to load the American-made portion of the cable at the Simplex plant near Portsmouth, N. H. As suggested in the opening paragraphs of this article, Clarenville, Newfoundland, was the next port of call. The sight of the 8,050-ton ship, bulking large against the low hills of the nearby bay, symbolized the importance of the cable-laying operation in the history of this development in overseas telephony. From these waters, the *Monarch* turned her bow eastward, paying out cable along her prescribed route on the initial stage of her cable-laying job. (The second chapter

The Transatlantic Telephone Cable



Oban, Scotland, is where the eastern end of the cable comes ashore.

Path-loss testing was important in selecting the route of the radiotelephone link between Portland and the Nova Scotia cable terminal.



The terminal building for the western end of the transatlantic cable is at Clarenville, Newfoundland.





H. M. T. S. MONARCH entering Portsmouth harbor.

The route of the transatlantic telephone cable system is one Alexander Graham Bell undoubtedly would have preferred to all others: New York and Montreal to London, via New Brunswick, Nova Scotia, Newfoundland, and his native Scotland. The inventor of the telephone sleeps in a simple tomb carved out of the native granite of a mountain top on his summer estate at Baddeck, Cape Breton Island, Nova Scotia. Crossing the waters of nearby Bras d'Or Lakes, the voice channels of the radio relay approaches will pass the very mountain where Mr. Bell is interred. Within about a mile of the estate, the Canadian Government has built an Alexander Graham Bell Memorial Museum which is being opened this summer.

is scheduled for next summer.) Several factors caused this path to be selected—a comparatively short route that avoids ice floes, fishing trawlers, and the paths of existing telegraph cables.

Radio Relay Facilities

LAST YEAR, engineers examined the terrain between Sydney Mines, Nova Scotia, and Portland, Maine, setting up temporary towers to make “path loss” tests to determine radio relay transmission conditions between prospective station sites. The availability of access roads and local power was studied, and the final route was established. Right-of-way was procured, often a complicated task involving exhaustive title searching.

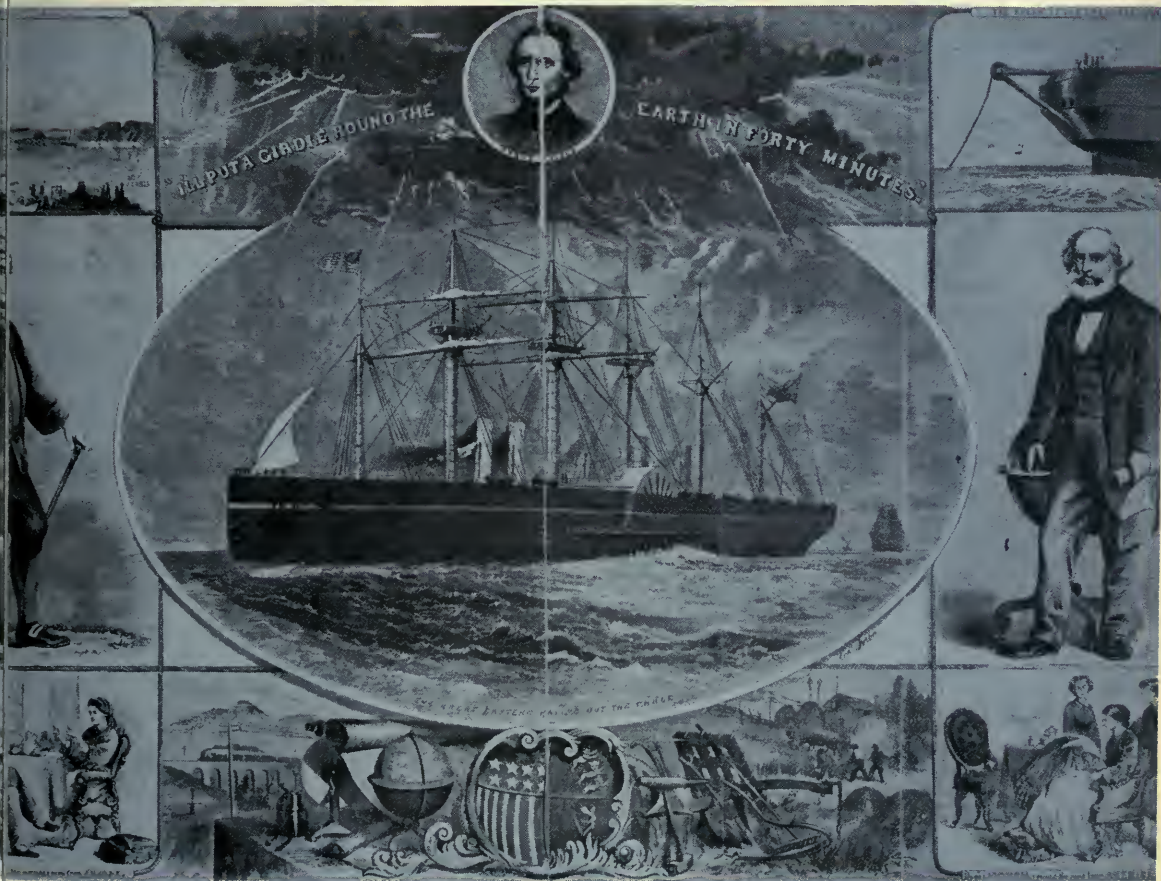
The American sector of the cable system is now in various stages of preparation for its ultimate task. The first two radio relay



Cable-laying apparatus used 90 years ago—from a contemporary magazine.

The laying of the first transatlantic telegraph cable was an internationally celebrated event.

BETTMANN ARCHIVE



On both sides of the Atlantic, individuals possessed of a variety of skills and representing many organizations have worked in close coöperation to make possible the construction of a telephone cable across the North Atlantic. Included in this large group are scientists, engineers, technicians, lawyers, financial specialists, office staffs, and administrators in the British Post Office and its Research Laboratory, the Canadian Overseas Telecommunication Corporation, the Eastern Telephone and Telegraph Company, the Northern Electric Company, and various units of the Bell System—the Bell Telephone Laboratories, the Western Electric Company, and the General Departments and Long Lines Department of the American Telephone and Telegraph Company. In addition, the companies supplying the materials for the cable and its apparatus, and others which are constructing buildings and towers or laying the cable, include a number of the leading business organizations of Great Britain, Canada, and the United States. They all take great pride in their contribution to the success of this historic undertaking.

stations beyond Portland—Brunswick and Liberty, which were originally set up as part of the Bell System domestic network—are being modified for their increased responsibilities. Work is under way on the next station, King's Mountain, where the tower will rise more than 260 feet, and the stations at Franklin and Cooper Hill are also under construction.

Already seven radio relay stations in New Brunswick have been erected, and five others in Nova Scotia are in process of construction. The radio relay station and cable terminal at Sydney Mines, Nova

Scotia, is also under way. In addition, the thirteen towers in this section of the system are being erected. Installers of the Northern Electric Company of Canada are busy putting equipment in these stations.

Construction crews, with bulldozers, back hoes, drag lines, air hammers, and dynamite, are at work digging the trench and laying the land cable across Newfoundland for the rugged 50-mile stretch between Clarenville and Fortune Bay. This portion of cable is being completed this summer so that it will be ready to connect with the submarine cable to be laid next spring in Cabot Strait between Newfoundland and Nova Scotia. This work is being done by contract under the supervision of engineers of the British Post Office, Canadian Overseas Telecommunication Corporation, and Eastern Telephone and Telegraph Company.

The cable stations at Clarenville, Newfoundland, and Oban, Scotland, were completed several months ago, and terminal and power equipment has been installed and tested. Radio communication circuits have been set up so that these stations and the *Monarch* will be in constant communication during the cable-laying operation. Radio range equipment has also been set up so that the exact position of the ship and the cable can be determined, regardless of fog or weather conditions.

Bell System Organization

MANY COMMUNICATION ORGANIZATIONS and manufacturing companies on both sides of the Atlantic are playing their parts in completing this great undertaking. On these shores the Long Lines Department of the American Telephone and Telegraph Company and its Canadian subsidiary, Eastern Telephone and Telegraph Company, are charged with the Bell System responsibil-

The Transatlantic Telephone Cable

ities for the enterprise. This includes all phases of the project, such as financial arrangements, selection of route, supervision of cable laying, construction of cable terminal and radio relay stations, scheduling and follow-through of the manufacture of cable and equipment.

In an international undertaking of this character there is necessarily a large volume of liaison work. A radiotelegraph printer has been established to handle correspondence between New York headquarters and London, so that policy decisions, interchanges of technical information, and a host of routine matters may be arranged between the participants. Montreal and Sydney, N. S., are other points in this administrative rectangle which settles methods for handling cash disbursements over the border, legal and auditing matters, and problems of supply.

As the *Monarch* plows eastward towards Oban, with the cable flowing over her stern, those involved in its accomplishment occasionally let their thoughts turn to earlier

milestones in communication. Morse's classic statement about the telegraph, "What hath God wrought"; Cyrus Field's ultimate triumph in laying the first transatlantic telegraph cable; and Bell's familiar, "Mr. Watson, come here, I want you," all come to mind. Soberly, the men responsible for this important new venture also give respectful heed to the awesome might of Nature, whether expressed in terms of aerial forces or the power of the sea. Yet the very need and pioneering aspect of the telephone cable project stimulates them, encourages their confidence, and makes them believe, with the Archbishop of Canterbury in Shakespeare's "King Henry V":

*As many arrows, loosed several ways,
Fly to one mark;
As many several ways meet in one town;
As many fresh streams meet in one salt sea;
As many lines close in the dial's centre:
So may a thousand actions, once afoot,
End in one purpose, and be all well borne
Without defeat.*



*Three successive MONARCHS have borne
this plaque, beginning in 1877.*

LIVING WITH GOVERNMENT

T. BROOKE PRICE

Vice President and General Counsel, A. T. & T. CO.

IT is a striking fact that the Bell telephone companies are made up of more people in more places than any other business in America. I speak of these people as being themselves the telephone companies because corporations really consist of people, and a nation-wide service requires nation-wide distribution of people.

It is not surprising, therefore, that our people have to deal with government in more places, under more forms and in more ways, than the people in any other single enterprise. Telephone people touch government as it is embodied in the national administration with all its ramifications, in the states, the counties, the cities and towns, the districts, the wards and boroughs in every section of the country.

Year by year, more kinds of government activities present themselves, administered by more officials and agencies. Legislation creates new types of regulation and sets up new governmental authorities. Administration becomes more complex and twines itself more deeply into the structure of American business. The process goes on in some measure in all industry, but nowhere so intensely as with the public service enterprises, and among them nowhere in such sheer magnitude and geographical scope as with the Bell System.

Living with government is thus an increasingly important part of the telephone career. Whether it is dealing with the local assessor or with the governor of the state, whether it is securing a street-opening permit or testifying at a Congressional hearing, the task is part of the never-ending operation of keeping the telephone business in alignment with the complicated structure into which our government has grown.

Since government has become such an important factor in the business, the telephone man must deal with it in business-like fashion. He must make sure in every case that there is a clear understanding of the facts and an appreciation of the reasons which require the action sought. A favorable reception of what he has to say is of first importance. This is best secured by having first gained the confidence of those with whom he deals. But underlying the whole relationship are deeper considerations which must never be overlooked.

These considerations apply throughout this whole great aspect of our business, manifold and diversified as it has become. From moment to moment and from place to place particular incidents occur and particular problems have to be faced; but no incident and no problem counts as impor-



tant in itself in comparison to the overwhelming importance of maintaining in all times and places a sound relationship between the Bell System and government. In these days, to live with government harmoniously, effectively, and with self-respect is one of the most serious and delicate responsibilities telephone people must face. It can only be accomplished by holding steadfastly to basic principles.

The first of these principles, I think, is to preserve unimpaired the reputation and standing of the Bell companies, nationally and locally, for integrity, responsibility, and fair dealing. I say preserve because that is generally the reputation our companies have borne down through the years. The telephone system stands in the public eye as a great national institution of high character. That reputation is an asset of immeasurable value, which in the past has served the System well when other busi-

nesses have fallen into disrepute and suffered in consequence through punitive legislation or regulation.

The second principle is the importance of taking the long view. Public officials change from time to time but the telephone business will still go on. In solving the problems of today we cannot afford to compromise the future. Any expedient that is wrong for the long pull will not do even for the moment.

An old lawyer gave me some advice in my youth that I shall never forget. He said

"Don't try to get the better of your opponent in a law-suit by a smart trick. Smart tricks don't pay. It is worth more to be known as the kind of man who doesn't resort to smart tricks."

It is worth more to the Bell System, too, that its representatives shall be known as people of that kind. Lawyers need such a reputation with the courts; telephone peo-

ple need it with government. What can't be got by square-shooting costs more than it is worth.

The last principle in my list is traveling the middle of the road. People come and people go; the sun shines at first on one side of the street and then on the other side. No corporation that must maintain important relations with government can afford to tie up with any party or faction. The much-sought alliance with the political powers of today may secure only disfavor from those in power tomorrow. And just

as it is dangerous to plant oneself in any man's political camp, so it is wrong to accept any man in public life as an irreconcilable enemy.

For we shall get what we are entitled to ultimately, regardless of the hostility or favor of this one or that one, on the merits of what this business requires in the public interest. So long as the telephone companies continue to earn public approbation and support by good service and high standards of conduct, government, by and large, will deal fairly with them.

Installers and repairmen have important role in Plant Sales Program which aims to bring complete service to customers and added revenue to the companies

WIDER HORIZONS FOR THE PLANT DEPARTMENT

RUDOLPH EKLUND

Plant Sales Engineer, O. & E. DEPARTMENT, A. T. & T. COMPANY

A NEW WORD was born to us in 1954: *merchandising*. No one word or activity in our business has claimed so much attention or grown so rapidly as has merchandising. It's been a tricky word from the start, subjected to many definitions and to many obstacles; but it also has been a successful word—and a successful way of business. And as yet we have just begun to explore the magic of it and have just begun to feel the wallop of its punch.

Operationally, our Commercial Service Representatives, along with our General Sales and Servicing people, have long geared their efforts to meet this newcomer, and they're doing a good job. So are our Directory Sales people. Traffic, too, has experienced success in the promotion of long distance usage.

But a new dimension is rapidly making itself felt in the field of merchandising. It's *Plant Selling*. Already tremendous strides have been made in this area by Plant people, and their accomplishments point toward future expansions and recognition.

In this the infancy of merchandising, Plant people in only six months of recorded sales have racked up an impressive record of 107,000 extension telephones sold. On a going-rate basis, all Plant sales add up to a whopping figure of over twelve million dollars of additional annual revenue.

But—just as important to us in Plant—thousands of our customers, perhaps for the first time, are experiencing the satisfactions of complete telephone service: service that has permitted them to use our equipment to advantage and to get full utilization and benefit from it.

It is against this background that we want to examine the concept of telephone merchandising, and the role which we as Plant people have in it—the concept of better service through sales.

Signs of Changing Times

LOOKING BACK to see how far we have gone forward—How many times has this question been asked?—“Now let's see—where do *you* think we should have the tele-



Telephone men are confidently approaching the public with a complete service package.

phone?" And how many times has the answer been, "How about here in the hall, or at the end of the living room—so that it'll be in the middle of the house." Probably more times than we like to remember, that brief conversation has been acted out by a customer and an installer.

But no longer is the question being greeted with a stock answer. The scene has changed and the installer's part is a happier one now. In the words of an installer from Illinois, "A couple of years ago, when we were short of instruments, I'd tell customers to put the phone in the center of the house. But now I try to find out and give them what they need. I point out the advantages of having two or even three telephones in different parts of the house. I tell them about colored telephones too."

"Actually, customers have appreciated my suggesting items which have improved their service. And I feel a heck of a lot better about it too. I never cared much about telling people they had to wait for service or that they couldn't have another telephone."

True, the words were spoken in Illinois—but like words and like thoughts are being echoed in garages and work locations everywhere. They have served not only to announce the arrival of Plant Selling, but to recognize that the real producers in Sales have found satisfaction in providing customers with complete service.

Providing Good Service

It is and always has been the belief of all of us in the Bell System that our first duty is to provide the public with good service. From the technical point of view, we have been successful in providing that service and in making provisions for even better service. Our 4A machines, CAMA, answering sets, and distant talking sets—just to name a few items—attest to this.

But there is more to good service than equipment and machines. Implied also is a thoughtful and responsible job by those who render this service; by those who come in contact with our customers. Into this sense of thoughtful responsibility the concept of telephone merchandising fits; the

Wider Horizons for the Plant Department

concept of providing for the telephone wants as well as the telephone needs of our customers; to make available to them for their convenience and pleasure the very best and most complete telephone communication service possible.

To this end, that we might acquaint and better serve our customers with what we have to offer in the telephone line, we have turned to active, aggressive selling—the end product of a merchandising program.

This was something new to many Plant people. Some of us remember the “sell-a-phone” days of the depression of the 1930’s, but to most of us it was to be a new experience, a new challenge, and a new way of life.

What happened?

Plant men and women who had been reared in an era of inability to meet demand eagerly began taking advantage of opportunities to promote better service:

On trouble tests, deskmen are suggesting and selling extension telephones.

Assignment clerks are providing information resulting in customers upgrading to a better class of service.

Repair clerks and order clerks, framemen and switchmen, are beginning to think and talk merchandising.

Heard everywhere, “There seems to be no limit to the services people can use.” But the hard fact remains that we have to merchandise our services actively if we’re to serve fully. We have to make people aware of their needs and what we have to offer.

“Most people don’t realize,” said an installer in Pennsylvania, “how little an extension telephone adds to their bill. People who have never had one don’t realize how convenient they are. It’s up to me to tell them and they thank me for it. As I see it, *Selling is Telling.*”

By whatever name you call it, be it merchandising or selling or servicing, by telling the customer and perhaps even showing him what we have in the telephone line, new telephone wants can be created in his mind—telephone wants which can help make his modern way of living a little easier, a little more convenient, and a little safer.

The Role of Plant Contact People

NO ONE is better qualified to do this than an installer or a repairman. Theirs is a unique and very select opportunity. As one man observed, “I’m not faced with the problem of getting inside of a door; in my hand is a service order, an invitation from the customer to come into his home.”

There are many things about a Plant visit to the homes and places of business of our



To show customers how an extension telephone would look in place, an installer takes two telephone sets to the door.

customers which enhance the value of the contact as a sales as well as a servicing opportunity.

To begin with, the Plant contact man is probably the only representative of the company many people ever see face to face. To them he is "Mr. Telephone." They recognize his expertness in the field of communications and they look to him for advice.

Then too, the visit comes at a time when the customer is probably more receptive to constructive suggestions for improvements in his service than at any other time. He's thinking about his telephone service and is willing to—in fact generally wants to—talk about it. Typically, an installer in Oklahoma says, "You can go into any house and show the customer exactly what he needs for good service and where he needs it. It's easier to sell, too, when you can see

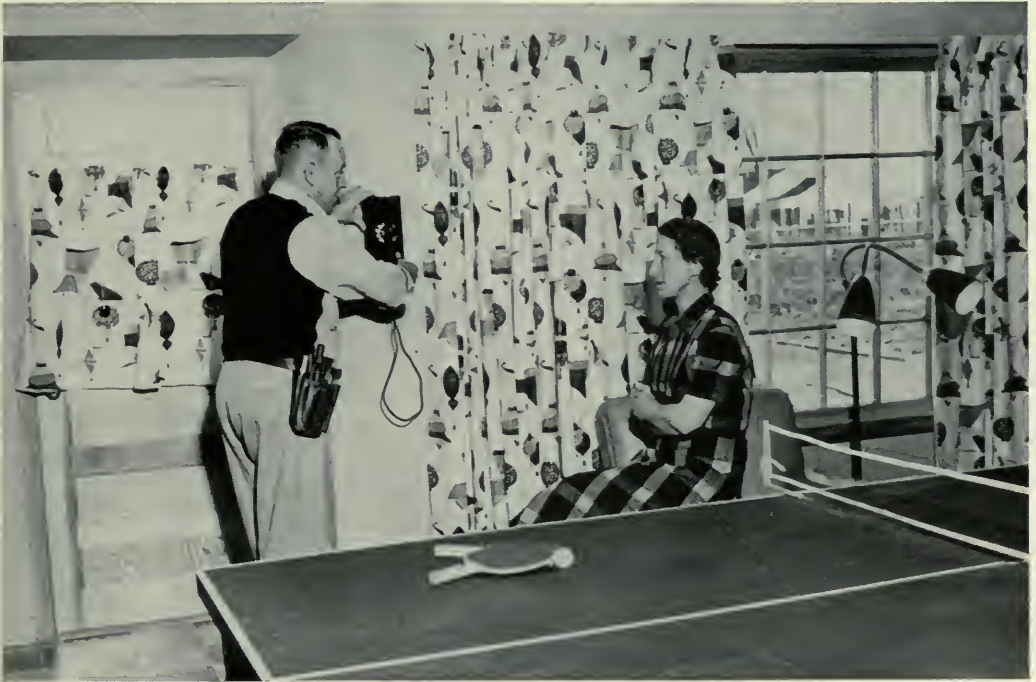
the customer's face as you demonstrate the convenience of additional service."

And that's the key opening the door of opportunity. You are with the customer right where he's asking for service. You can see what the place looks like. You can look around and observe some of his evident telephone requirements and, through a perfectly normal and natural discussion, determine some not so evident. Put it together and the door is wide open. You know what he needs or should have for full service and you know what you have *available* in the telephone line to satisfy those needs. Suggesting it to the customer is the start of a sale.

There is hardly a limit to the service we can render the customer, and only the ingenuity of the installer or the repairman and the needs of the customer should limit the results in so far as sales is concerned.



"This is the set I was telling you about. You'll really like it in the kitchen. It will be a big convenience for you there."



"How about this location?" an installer asks. With the customer he helps decide where the telephone will go. He knows that location is important if it is to be convenient and used.

Package Selling

THE IMPORTANCE of doing a complete "package" service job on the initial installation visit can't be over emphasized. Selling complete service at one time has many advantages over selling "by the piece." There is only one installation visit, the customer doesn't have to wait for the service he needs, we get the revenue from the time of the sale.

As long as there is something our customers want or need in the line of telephone service, they are not getting the best service. Unfortunately, for a period of almost fifteen years we were in the position of not always being able to give an adequate or full service.

It's significant that those unhappy days of shortages and restrictions were with us

for so long that many of our customers now *think* in terms of shortages. They are putting up with inadequate service because they think that it's the best that is available. And there is no escaping the fact that we have had a lot to do with that thinking, for we encouraged them—even insisted—to accept far less than complete service. Basic service, we called it.

But now that our restrictions and waiting lists are fast disappearing in most places, we in the telephone company have an undeniable obligation to let our customers know what is available to provide the service that best meets their needs. That is the first objective: to market all our telephone services so that customers' needs are anticipated and fully satisfied. The more convenient and personally satisfying we make our service, the more closely we approach



Garage meetings were held to introduce Merchandising to Plant people.



Sales is a subject at brief informal meetings held by Plant foreman before installers and repairman leave for the job. The latest supply report is discussed here.

our goal of providing the best possible service to our customers.

To be sure, some shortages still exist, but our huge construction programs are fast catching up to them.

And—thank goodness!—the instrument problem is easing. Telephone set production is at full throttle. Expanded manufacturing facilities have paved the way for a record-breaking production year in 1955 of five million telephone sets. Over a million and a half more than that produced in any other year!

In this atmosphere we as Plant people have a responsibility to *assure* that our customers have what they need or want in telephone service, or that we at least make known to them what is available to make

their service modern, up-to-date, and more useful.

This is not a one-man or a one-group or a one-shot job by any stretch of the imagination. Far from it! The coördinated job of creating a market favorable and receptive to our services is part of everybody's job.

Everybody's Job

EMPHASIZING THIS, interdepartmental merchandising committees have been established in many companies. Generally these committees have outlined the objectives of a merchandising program, have helped set up training and employee information programs, and have been a sounding board for ideas designed to stimulate interest and activity in the program in general.

Wider Horizons for the Plant Department

Along with this, employee information programs generally are under way to acquaint *all* our people with the philosophy of merchandising: what it is, why we're in it, their part in it, what we have to sell, and perhaps how to go about selling it.

The Public Relations people are active. Public displays—"Telephone Super Markets"—in the lobbies of company buildings and at home shows and open houses have been instrumental in introducing to the public some of the equipment and services which we have to offer. Some of our employees, too, are seeing for the first time many of the new items in the telephone line at these displays.

Letter stickers, bill inserts, posters, even billboards have been recruited to take the sales message to the public.

Key to Success: Tell the Public

A BIG PART of any sales program is merely telling. Telling the people whom you meet about what's new in telephone service, what's available to them, and how they can make their telephone service more convenient, more useful, and more valuable.

The spotlight is on everything that will improve the telephone service of our customers; whether it be an additional listing, a long distance call, credit cards, or an arrangement of equipment to best suit a customer's individual needs. They all add up to better service and improved revenues.

Sales Minded Training Programs

THERE WERE some problems when we turned to Plant Selling—yes. It isn't easy to break from tradition—and for many years to our customers we'd been saying mostly "no" and little else. Small wonder then that "I don't know anything about selling. I

can't sell. I wouldn't even know where to begin," was a voice heard early in the program.

To help reverse the polarity of this thinking, in fact to help *all* Plant people recognize opportunities for sales and how to capitalize on them, sales-minded training programs of a participation type were designed. Stressed in these programs was the importance of naturalness, the importance of being yourself and of talking to customers in your own way and manner. Featured too was the service angle—giving the customer complete and adequate service the first time out. Genuine sales—sales to improve the value of our service—were highlighted! We're not in a sales program just to sell pieces of equipment; we're in a merchandising program to give better service and through better service to realize additional revenues.

With facilities and supply still a variable to be reckoned with, without program and control, we could sell ourselves, in some cases, into shortages and unfilled orders again. We do still have some unfilled orders and our very first business is to satisfy them as quickly as possible. And we want to take care of all our "over the counter" business too. So there are no universal rules of the thumb to apply to our merchandising program except one—to sell the items we do have when they are available or reasonably available, to the end that we may serve adequately as many customers as possible the very first time we visit with them.

An Unlimited Market

THE BEST PART of this sales story is that there is a good sales market. Economists tell us that the discretionary spending power of the nation—the amount of money left over after paying fixed expenses—is four times that of 1940. It means that the

public is in a better position to buy our services.

If we're to meet this challenge and the challenge of this market, there's a job to be done by all of us in the Plant Department. Telephone service contributes much to good living and to good business. Part of our Plant job—to the best of our ability—is to make sure that our services are so attractive and so pleasing that people will *want* them as much as they want the other items that compete for their favor.

The time has come to cast overboard the ancient idea of one black telephone in the center hall. How aggressively we sell our products today will determine whether

multiple extensions and new advances in the telephone art become as commonplace tomorrow as the single telephone is today.

Just think of the potentialities if every installer and repairman became inspired to absorb this servicing job into his everyday thinking. When you reflect for a moment that we have a total of more than 25 million customer contacts a year in the Plant Department—25 million opportunities to give our customers more complete service through the sale of extensions, additional lines, colored telephones, loud ringing bells or any of the many other items of service we have to offer—it is, indeed, an exciting and challenging horizon we have before us.



Everybody is interested in the telephone.

613-LO4-5678: *This is the sort of number you will dial one of these days to reach distant telephones throughout the United States and Canada*

DIAL SERVICE IS EXTENDING ITS REACH

ROBERT G. ELLIOTT

*Assistant Chief Engineer, AMERICAN TELEPHONE AND
TELEGRAPH COMPANY*

BACK IN 1928, when I first went to work for the Bell System, a total of about 14 million System telephones were in service. Now, 14 million of anything is a tremendous number; yet at the present time the Bell System serves something over 43 million telephones—which is a lot more.

What has caused this growth? Population increase, of course; but, additionally, a continuously improving and more valuable telephone service.

The one product we have for sale is communications, and as long as we continue to improve that product the demand for it will grow.

In the years past we have improved the quality and scope of the service we render. Telephone service has been mechanized locally, it has become faster, and it is much more widespread.

As another phase of our efforts toward a better and more nearly universal telephone service, a program was launched a number of years ago which has as its ultimate objective direct dialing of calls between any

two telephones in the United States and Canada. The billing information for such calls will be recorded automatically, and connection will be established without assistance of an operator. This program is a major undertaking in all respects: planning, development and research, financing, and construction by the Bell System and Independent telephone companies. We may think of it as progressing steadily—even rapidly—along four principal and closely interrelated lines:

- Local Mechanization
- Telephone Numbering Plans
- Automatic Long Distance Switching Plan
- Automatic Recording of Billing Information

To be successful, the direct distance dialing plan must provide arrangements that are simple and easy for customers to use. This requirement is fundamental to all the planning work.



Numbering Plan areas and codes for the United States and Canada.

Dial Service Is Extending Its Reach



Today's view of the basic dial switching network in 1965.

Local Mechanization

IN THE 1920's, when the Bell System had relatively few dial telephones, it was decided to go ahead with a local mechanization program and gradually to convert the local manual service to dial, over a period of years as opportunity was presented. This program has progressed continually over the years from 2 percent in 1920 to 84 percent in 1954. Present plans show that by 1958, about 95 percent of all telephones will be dial—and the 100 percent mark will be approached shortly thereafter.

Telephone Numbering Plans

A PRIMARY REQUISITE for nation-wide customer dialing is that each customer be assigned a distinctive telephone number—one that does not conflict with the number of any other customer in the United States and Canada. It is essential that these numbers be similar in form, be convenient to use, and that they be compatible with local and extended-area dialing arrangements.

Telephone numbers for nation-wide dialing will consist of two parts: an area code of three numerals, to designate the geographical numbering-plan area; and a directory number, consisting of the first two letters of the central office name followed by five numerals, commonly termed 2-5 numbering.

The United States and Canada have been divided geographically into over 100 *numbering-plan areas*, each of which is assigned a distinctive 3-digit designation called the *area code*. Calls from one numbering plan area to another (known as foreign-area calls) will, in general, require dialing the code of the area in which the distant customer is located as well as his directory number. Home-area calls, which

originate and terminate within the home numbering-plan area, will ordinarily require dialing only the called customer's number as listed in the local directory.

About 50 percent of the more than 43 million telephones in the System are now arranged on the 2-5 numbering basis. It is expected that about 75 percent of these telephones will be so numbered by 1957, and that the job will be approaching 100 percent completion by 1960.

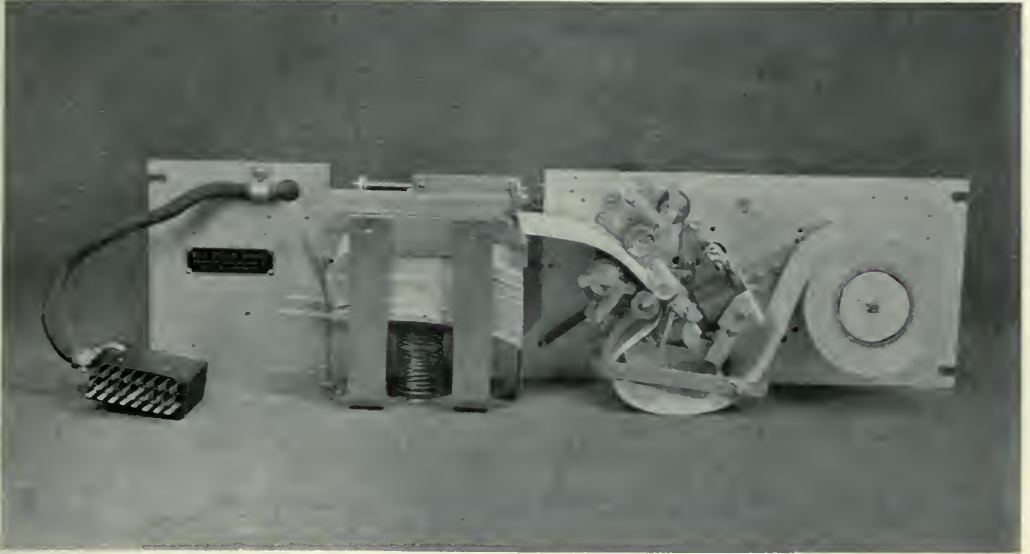
Automatic Long Distance Switching Plan

ANOTHER BASIC REQUIREMENT for nation-wide dialing is a switching plan that provides for routing traffic automatically and rapidly between any two locations.

A general switching plan for handling long distance traffic on a manual basis has been in operation for more than 20 years, but some modifications were necessary to adapt it to nation-wide dialing.

Photographing a bank of message registers used for bulk billing of customer-dialed calls.



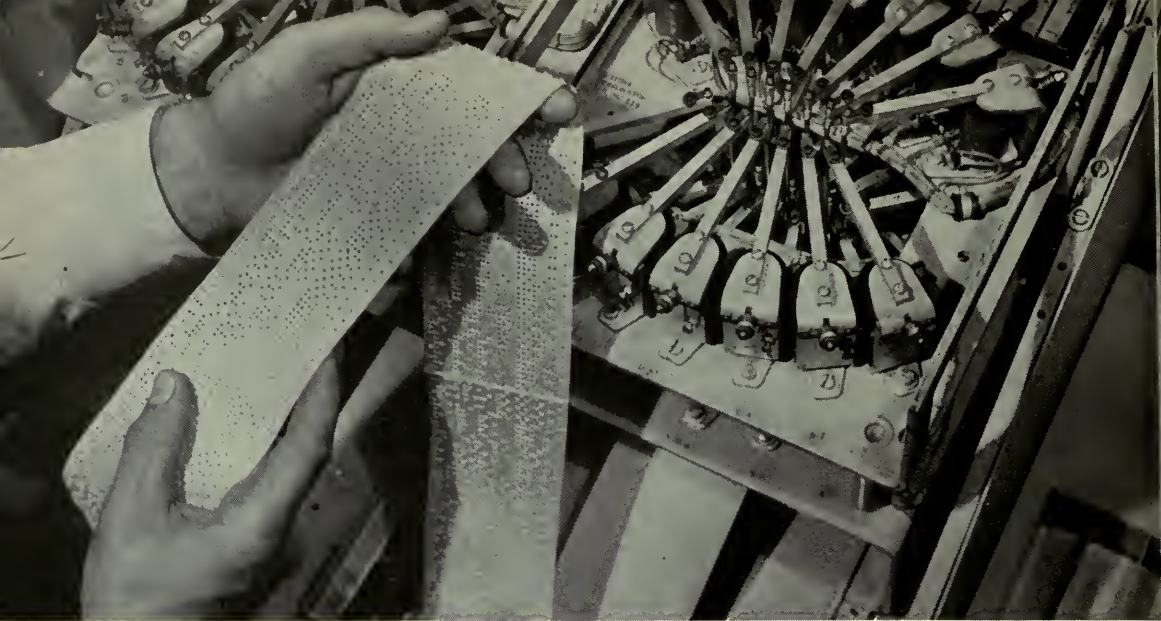


An automatic ticketer, which prints tickets of customer-dialed calls.

All offices in the country have now been classified according to their position in the switching plan. This classification divides the country into switching areas, termed regional, sectional, primary, and toll center (the latter is a long distance switching center serving directly a group of local offices). There are nine regional areas in the United States and two in Canada, each served by a regional center. There will be about 225 important switching points within these areas. Some 60 major locations will require the 4A toll crossbar type of switching system, with approximately 165 other locations having systems with lesser switching capabilities. Of the 60 major locations, 34 have already been provided with No. 4 toll crossbar equipment, 10 more are planned to be in service by the end of 1956, and it is expected that the balance of these major locations will all be equipped with No. 4 equipment by 1960. The other important switching points have been or will be equipped with crossbar tandem, #5 crossbar, or step-by-step systems for switching purposes.

All of these switching points will be interconnected by a network of intertoll trunks in accordance with a fixed pattern. Every local office will have a last choice or "final" route to its toll center, each toll center will have a "final" route to a primary center, each primary center will have a "final" route to a sectional center, and each sectional center will have a "final" route to a regional center. It is not necessary that this complete chain be provided in all cases. For example, some toll centers will have final routes to sectional or regional centers, and some primary centers will have final routes to regional centers. One of these regional centers, St. Louis, has been tentatively classified as the national center, and all of the regional centers will have a "final" route to the national center. Thus, any local office can be connected over this final or back-bone route chain to any other local office in the country. However, it has been estimated that only a few calls in a million will ever have to be routed over this final path.

A great many calls will be routed over



AMA perforators, which record billing information on a punched AMA tape.

direct or so-called "high usage" trunk groups. These high-usage groups will be provided between all classifications of switching centers where there is sufficient traffic to make them economical. This plan, which is being introduced in an orderly fashion, permits automatically rerouting calls over alternative routes when "all circuits busy" conditions are encountered on direct routes. It makes possible the use of margins in one route to relieve congestion on another route to a much greater extent than under manual operation.

The last choice is the "final" route to the next higher switching center.

The ability of the automatic switching machines to test rapidly a number of different routes for an idle path makes alternate routing possible and where used will give long distance service with essentially no delays.

At the present time about 55 percent of the intertoll trunks in the country are provided on a dial basis, which are used now largely by operators and only to a small extent directly by customers. Rearrangement of the network to the high usage and final route basis has already begun, and

plans call for rapid strides in this job during the next few years.

Automatic Recording of Billing Information

DIRECT DIALING of calls beyond the local calling areas requires that certain data be obtained automatically in order that chargeable calls can be billed. Some service between near-by points is furnished under zoned or multi-unit plans, which employ "bulk" billing. This requires only the number of message units to be associated with the calling number. Other service between near-by points and all long distance service is furnished under rate plans which require detailed bills. The minimum data which are required for detailed billing include:

The called telephone number (7 or 10 digits)

The calling telephone number (7 digit)

Date

Time of day

Length of conversation

ZONE REGISTRATION. In the late 'twenties, investigations were made to see whether the dialing ranges could be extended be-

Dial Service Is Extending Its Reach

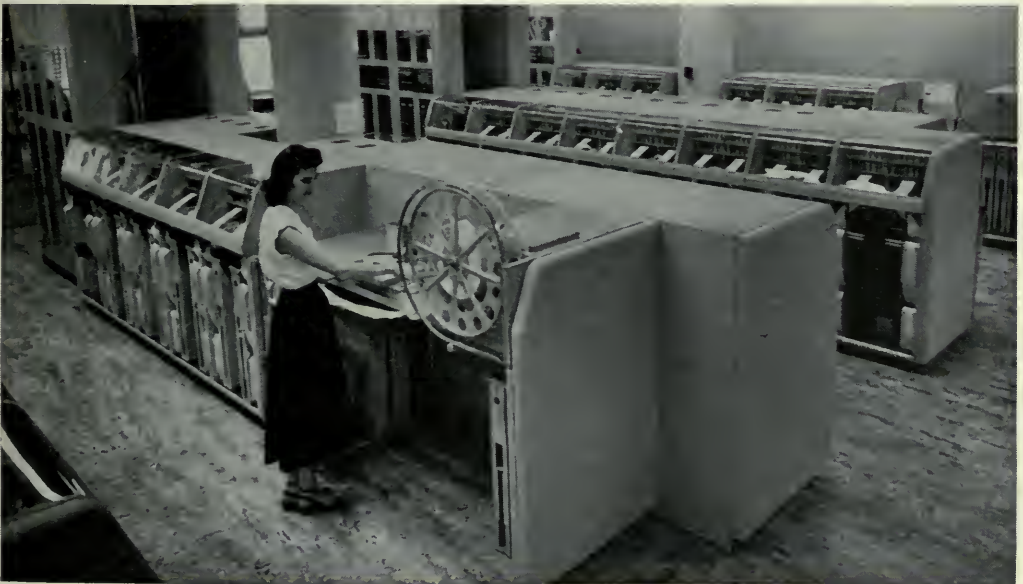
yond the local dialing area. The best opportunities were found in the large metropolitan areas, which could be subdivided into various rate zones and message-unit charges applied between the various zones. Electric counters called message registers were associated with customers' lines in panel-type dial equipment and used to record the number of units required for charging purposes. This arrangement is known as zone registration and was the first arrangement used by the Bell System for automatically recording billing data on a bulk-billed basis.

The service was first introduced in New York in 1931 on panel equipment, and also applied to No. 1 local crossbar offices when this system was introduced in the late 'thirties. By the beginning of World War II, six of the largest metropolitan areas in the country had this service. These were New York City, Boston, Chicago, Northern New Jersey, San Francisco, and Philadelphia. At first zone registration was limited to two or three message units, but was

gradually extended to five message units. The largest volume of messages handled by this system today is in New York City.

AUTOMATIC TICKETING. Need also developed at an early date for equipment to record billing data in step-by-step areas—especially in Los Angeles, where the short-haul calling rate was very high. To meet this need, the automatic ticketing system was developed, and was first introduced in the Los Angeles area in 1944. With this system, customers can dial 7-digit home-area calls and the billing information is automatically recorded on a ticket, which is manually processed in an accounting center in the same way as is a ticket prepared by an operator.

This service is now in use in over 20 locations in the Los Angeles area and in some offices south of San Francisco, and the customer is able to dial calls over distances for which he is charged up to eleven message units. Developments have just been completed whereby this system can be modi-



Machines in an automatic message accounting center which are used to process AMA tape.

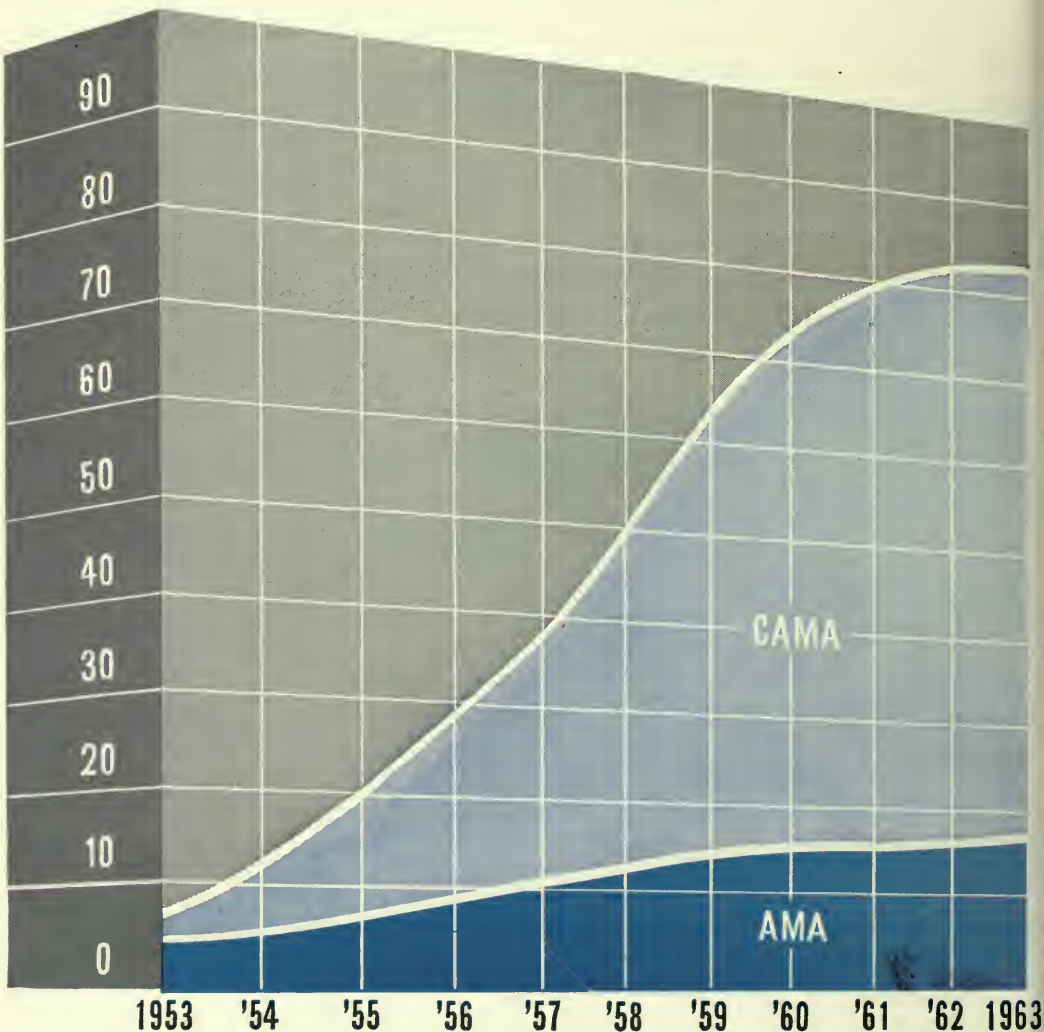
fied to produce a standard AMA tape (as described in the following section) instead of a ticket. This will allow these tapes to be processed in the same accounting centers provided for AMA. This new automatic ticketing arrangement will be capable of handling both 7-digit home-area and 10-digit foreign-area called numbers.

AUTOMATIC MESSAGE ACCOUNTING. Following the war, work was started on the de-

velopment of a system for recording billing data for use with local crossbar systems. This system, known as automatic message accounting (AMA), was first placed in service in 1948 in Media, Pa. The information needed for accounting purposes is punched into a special paper tape, and these tapes in turn are processed in an automatic accounting center. Messages can be billed either in bulk or in detail.

An accounting center can, of course,

Estimate by years of the percentage of main telephones having access to automatic message accounting centers or to centralized AMA.



Dial Service Is Extending Its Reach

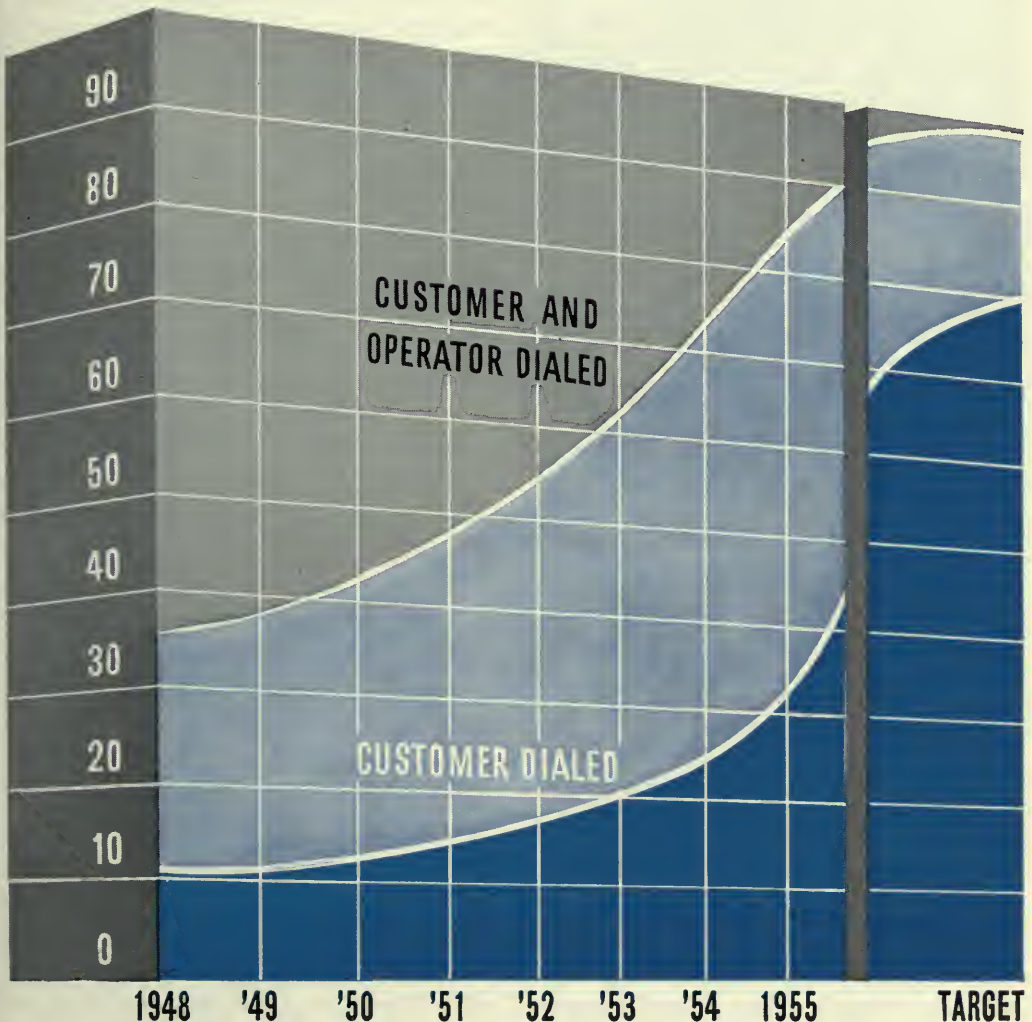
process the tapes from many AMA offices, and at the present time there are about 150 central offices using AMA, and 15 AMA accounting centers.

Subsequent modifications were made available for use in the No. 5 crossbar system which would permit customers to dial on a 10-digit nation-wide basis. This arrangement was first installed in Englewood, N. J., in 1951 as a trial, with customers dialing directly to about 11 million tele-

phones in such places as San Francisco, Oakland, Boston, Philadelphia, Detroit, Cleveland, New York, and Pittsburgh.

This trial was so successful that the service was retained there, and has now been installed at some 30 other locations. In all of these locations, customers can now dial directly about 14 million telephones in 16 metropolitan areas from coast to coast, and about 25 more such locations will go in service this year. Although at present the

Estimate by years of the percentage of long distance and multi-unit messages dialed by operators and by customers.





Switching frames of a No. 5 crossbar system.

volume of 10-digit messages dialed is not large, this service is an important step toward the ultimate objective.

In addition to these places where 10-digit dialing will be started by the end of this year, there will be about 50 other locations which will be doing limited 10-digit dialing until arrangements are completed for them to use the nation-wide network.

CENTRALIZED AUTOMATIC MESSAGE ACCOUNTING. All of the recording systems mentioned so far are used in local central offices. It was realized that, because of insufficient traffic in some instances and certain limitations in others, the installation of these systems everywhere could not be justified. This led to the development of a system which used the AMA principles on a centralized basis. Here the recording equipment is installed at a centralized switching location and is arranged to serve a number of local offices in an area, thus distributing the cost of the recording equipment over a large number of stations. This is called centralized automatic message accounting (CAMA). The customer dials the number he wishes and an operator is momentarily brought in on the connection to request the calling subscriber's number and key it into the recording mechanism. This operator identification of the calling number is a temporary arrangement and development work is going ahead on automatic identification equipment so that it will not be necessary to bring in the operator. Other than this, the recording of the details of the call is automatic.

The first installation of this system was made in Washington, D. C., late in 1953. Since then CAMA systems have been placed in service in Detroit, San Francisco, Oakland, Philadelphia, New York, Jersey City, Morristown, and Newark, N. J., and

Dial Service Is Extending Its Reach

Cleveland and Pittsburgh. These installations in some cases supplement the use of zone registration. There are a number of CAMA installations to be made in the future. This system, used at present in the metropolitan areas, extends the dialing ranges of large numbers of customers and provides for direct dialing of large volumes of short-haul traffic.

At the present time the system is only applicable to panel-crossbar areas and in general is limited to 7-digit dialing by the capacity of the senders in the local office. A development is now almost completed which will expand the capacity of the local senders so that customers in these offices will be able to dial 10-digit calls on a nation-wide basis.

Also under development is a 10-digit CAMA system for use in step-by-step areas with crossbar tandem. The first installations will be made in Hartford, Conn., and South Bend, Ind., for service in the Summer of 1956. Nation-wide dialing will be possible with this system. However, in areas served by step-by-step dial offices the customer must dial an access code (112) before dialing either the 7-digit number to reach telephones in the home numbering-plan area or the 10-digit number to reach those in foreign areas. Exploratory studies are in progress to determine the best arrangements whereby ultimately the use of this 112 access code can be eliminated.

By the end of 1955, about 20 per cent of the main stations in the Bell System will have AMA or CAMA access. Our estimate is that this will reach 85 per cent by 1965.

Conclusion

WE HAVE MADE real progress during the past several years in the extension of the direct distance dialing program.

Today operators are dialing over half of

the long distance and multi-unit calls. In some instances, however, the operator is using special routing codes instead of the proposed area codes, and also is completing calls to some offices not on a 2-5 numbering plan. Neither of these practices is practical for direct distance dialing by customers.

Customers are now dialing about 25 per cent of the long distance and multi-unit calls, but by far the greatest proportion of these are the short-haul multi-unit 7-digit calls. Of this 25 per cent which is being directly dialed, more than one-third are handled by Zone Registration equipment, 10 per cent by automatic ticketing, and the remaining 55 per cent by AMA and CAMA systems.

This over-all mechanization program is bringing about the integration of the local and long distance plant of the United States and Canada into one system comparable to that serving a metropolitan area.

In addition to the more important developments in the current picture which are essential to the direct distance dialing program, the need for others will arise in the future as the System strives to give better and better service. However, the program will not stand still during the development period. Instead, the Operating Companies' plans call for continuing progress in all of the major parts of the program: Local Mechanization, 2-5 Numbering, Automatic Message Accounting Facilities, and the implementation of the Automatic Long Distance Switching Plant. As now planned, the program will be spread over ten years or more. It requires continuous planning work and close inter-company and interdepartmental coördination. A major job indeed is still ahead; but the result will be a better, more convenient, more valuable, *universal* telephone service.

Their growth since the War parallels that of the Bell System, and augurs truly universal service through continued coöperation between the two groups

THE INDEPENDENTS TODAY

HARRY DISSTON

Independent Company Relations Engineer,

O. & E. DEPARTMENT, A. T. & T. COMPANY

IN FALLS RIVER, IOWA, Claude Anderson owns a telephone company.* He is president. He is also general manager, chief engineer, general plant manager, general traffic manager, general commercial manager, and director of Public Relations. His company serves some 350 subscribers on 100 lines terminated in modern dial equipment in an attractive cement and brick building which is pointed to with pride by the local community.

Mr. Anderson owns a majority of the stock, but he has interested a number of his neighbors, business men in the town and farmers, in becoming share owners in the company. Funds loaned by his local bank and a large city bank helped materially in rebuilding and modernizing the plant and equipment (an up-to-date unattended dial office) and materially increasing the number of subscribers. Members of the local community have a good investment—both financially and service-wise.

Mr. Anderson's company is an "Independent." And what is an Independent company? Simply one that is not a Bell System company.

The "Independent" Falls River company is in some ways typical. But there are smaller companies—some with as few as 100 subscribers. On the other hand, Independents serve such large cities as Rochester, N. Y.; Lincoln, Nebr.; Tampa, Fla.; Erie, Pa.; Fort Wayne and Terre Haute, Ind.; Durham, N. C.; Santa Monica and Long Beach, Cal. In addition to Lincoln, two other state capitals—Jefferson City, Mo., and Tallahassee, Fla., are served by Independent companies. In several instances a number of Independents are combined to form a "system." The largest of these at present comprises 16 operating telephone companies and serves nearly two million telephones.

It is truly remarkable that while nearly two million long distance calls a day are handled jointly by Independent companies and Bell System Companies, the customer feels that only one, "his" company, is taking care of his business—unaware that his message may involve facilities and operators of two or more separate companies, Independent and/or Bell. This is a great strength of the telephone industry.

* Place and name are imaginary but representative.

The Independents Today

4,900 Independent Companies

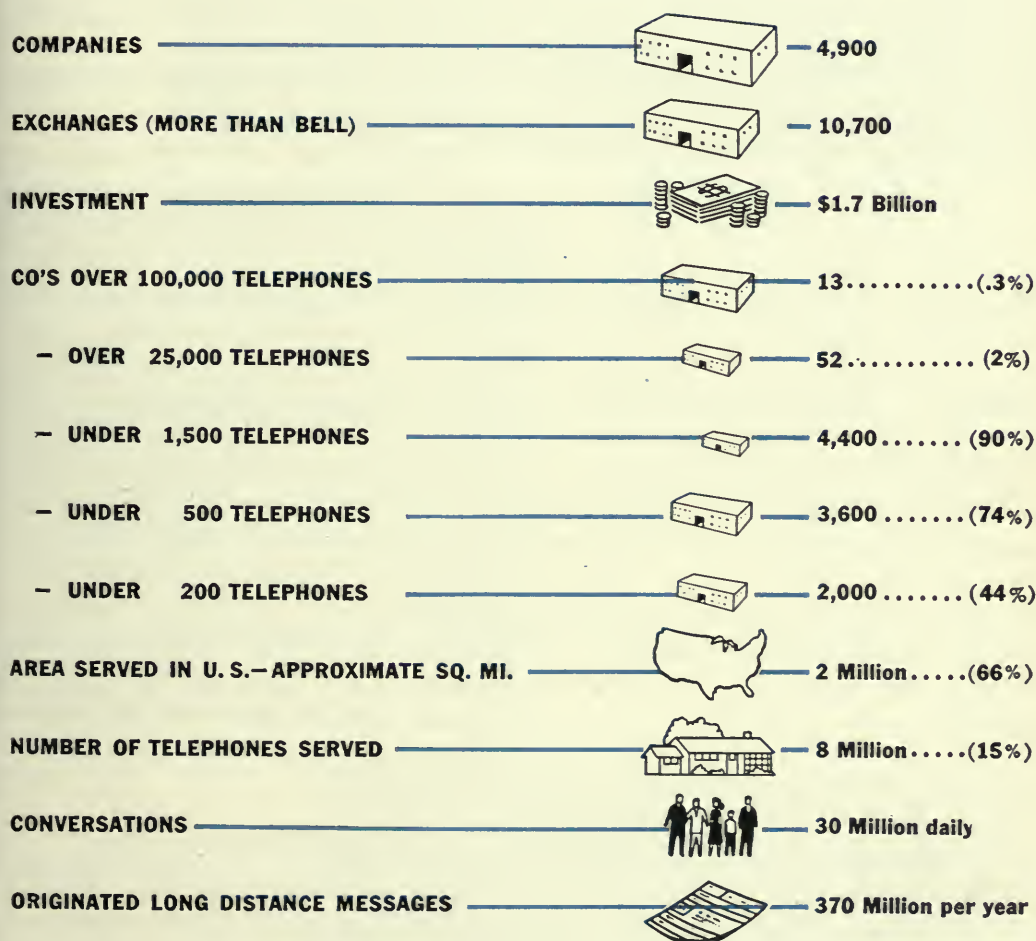
WITHIN THE EXTREMES of the very small Independent, serving a rural area, and the large Independent, serving one of the leading cities, are some 4,900 separate and distinct Independent telephone companies. Almost 2,200 have fewer than 200 telephones, and nearly 3,600 have fewer than 500 telephones. Only about 500 have more than 1,500 telephones. Together, the 4,900 Independents serve approximately two-thirds of the geographical area of the United States. Most of this area has been

rural—on the other hand, a good deal of population and industrial growth is expected in these sections.

The Independents operate about 8 million telephones—roughly 15 per cent of the telephones in the United States—through about 11,000 central offices. It is interesting that the Independent central offices exceed the number in the Bell System by about 1,500.

In volume of business, the Independents do a tremendous job. Some 30 million telephone conversations pass over their lines

THE INDEPENDENTS TODAY



daily, and they originate annually nearly 370 million toll messages—with a revenue value of about \$240 million—which flow over both Independent and Bell System facilities to the telephones of Bell and Independent company subscribers. In turn, approximately an equal number of toll messages is originated by Bell customers to the telephones served by the Independents. Investment in Independent telephone company equipment and plant is in the order of 1.6 billion dollars, and the Independent companies employ perhaps ninety thousand people. The Independent segment of the industry is indeed important to this nation.

Growth among the Independents during the last ten years—paralleling growth in the Bell System—has been remarkable. Compared with ten years ago, the number of Independent telephones has almost doubled. During the same ten-year period, toll messages interchanged with Bell System companies increased 70 per cent and the revenue value of the messages even more—due to customers calling more distant points and talking longer, and to some extent due also to increases in rates. Investment in plant and equipment more than doubled, while the number of employees was half again as many as ten years ago; the number of customers served was nearly doubled also. Accompanying this substantial growth in items representing volume of service rendered there has, however, been a statistical decrease in two items—the *number* of Independent companies and of central offices.

Fewer But Stronger Companies

OVER THE TEN-YEAR PERIOD, the number of Independent companies decreased by about 1,300, from 6,200 to the present 4,900. So-called “farmer lines” or “switchers” are

also decreasing. This reduction in the number of Independent companies has resulted largely from mergers of a number of small companies into larger Independents, with resultant economy and improvement in management, and the acquisition of small Independents by larger ones in the interest of economic integration of their properties. So, while there is now a smaller number of Independents than formerly, they are today stronger—financially, service-wise and management-wise. As a matter of fact, it is evident that telephone companies generally are expanding their thinking, equipment, plant, and operations to provide a modern, flexible, comprehensive service geared to the customers’ changing and expanding requirements and utilizing the most modern techniques.

Today, about 60 per cent of the Independent telephones—and bear in mind that a large proportion are in rural and suburban areas—are dial. Along with this, the Independents generally are keeping pace with the modern trends in technology, operator and customer distance dialing, the use of carrier systems, radio relay (micro-wave) circuits, and like advances. Improvements in service include the most modern type of business office, coin telephone development and the installation of outdoor booths, extension and improvement of service in rural areas.

In modernizing and expanding their plant, equipment, and service in rural areas, a number of Independents, including mutuals and coöperatives, have received substantial aid from the Federal Government through the Rural Electrification Administration.

Independent Manufacturers Too

THE INDEPENDENT INDUSTRY is well equipped and supplied by five major and



Typical Independent company structures—including a headquarters building, a community dial office, and two which house both business and operating departments.





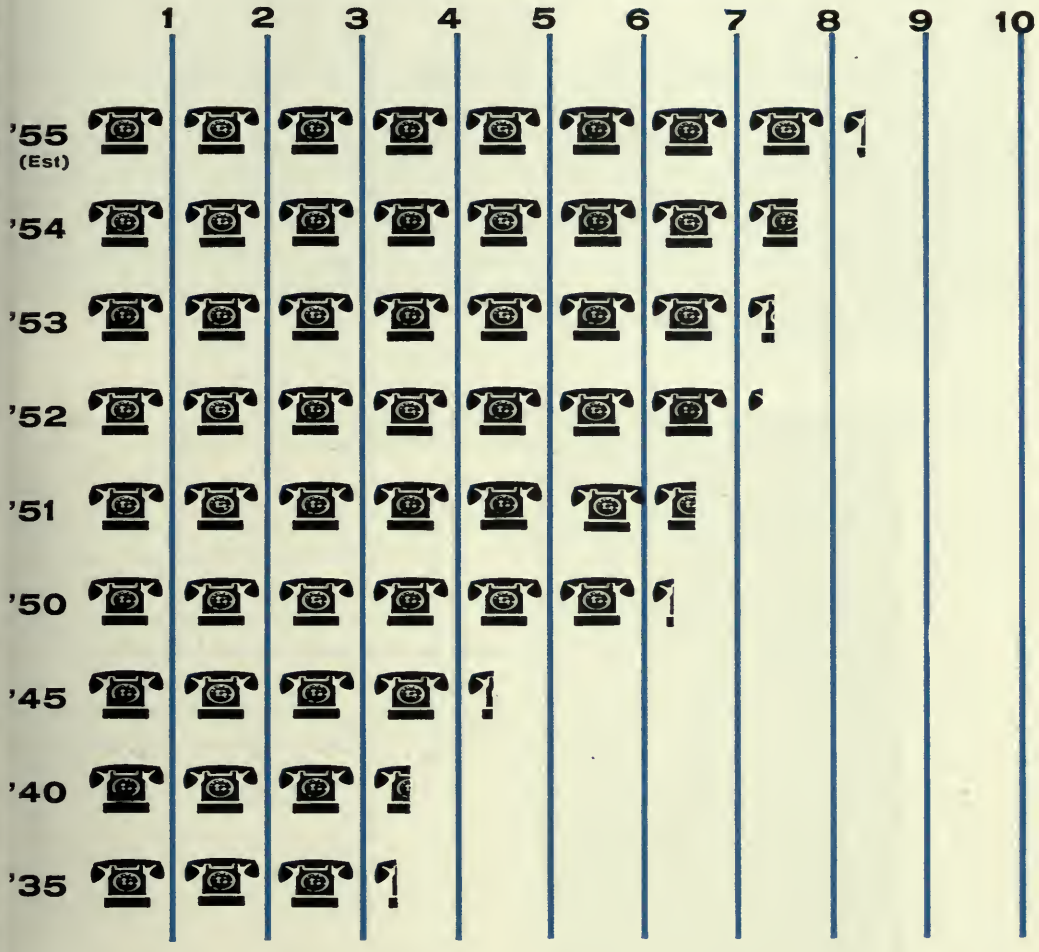
Traffic women meet for discussion of problems of mutual interest.



*Above: A Plant Clinic learns the latest in splices.
Below: A spacious and well-equipped business office.*



TELEPHONES (Millions)



some 200 other Independent manufacturers and suppliers. They provide high grade modern products in everything from dial equipment, cables, and coin telephone booths to insulators, pliers, and stationery. Several companies specialize in providing a complete directory service. Others preserve poles and trim trees and there are several engineering and accounting consultants available to the Independent companies.

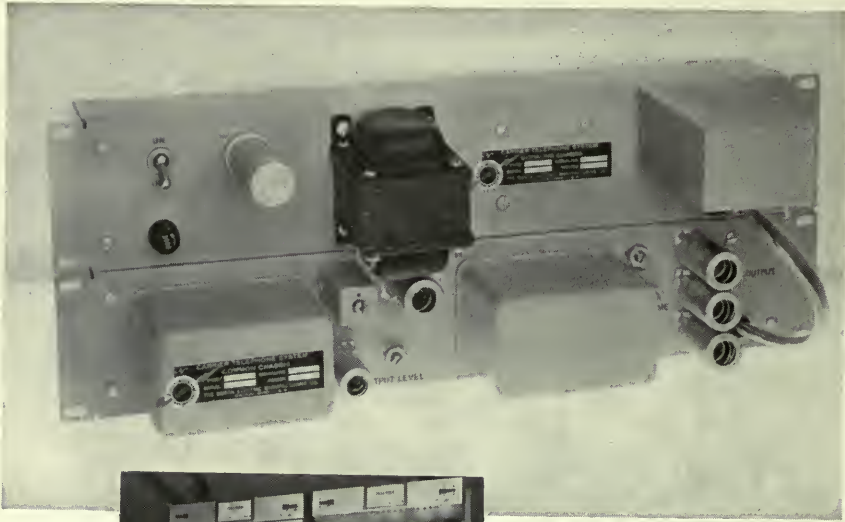
The industry is also served by a number of trade journals. Included among these are: the weekly *Telephony*, *Fortnightly*

Telephone Engineer, *Telephone Engineer and Management*, and *Telecommunications Digest*.

Associations

THERE ARE 34 ASSOCIATIONS of Independent telephone companies. Each generally includes all of the Independents in a state; however, in the Rocky Mountain area, eight states are included in the association, and Alabama and Mississippi have a joint association. All but six states are represented in some association.

These associations gather and dissem-



Modern equipment serves Independent company customers. Here are shown, from top to bottom, carrier system chassis, microwave radio bays, and dial equipment bays and power equipment.



The Independents Today



Attractive telephones are produced by Independent manufacturers.

inate useful information and pamphlets, watch and report on legislation affecting the industry, frequently represent the Independent groups in contacts with state legislatures and regulatory bodies, provide assistance to small companies, and provide a group contact with the Bell System companies. Their annual conventions are important and popular affairs.

Representing the Independent industry as a whole is the United States Independent Telephone Association, with headquarters in Washington, D. C. About 80 per cent of the telephones of the Independent segment of the industry are operated by member companies of this important organization, which includes also the bulk of the Independent manufacturers. The association furthers and represents the common interests of the Independents; acts as their spokesman and represents them in contacts with the Federal Government and with the Bell System; provides a sounding board and clearing house for that segment of the industry; publishes statistics; and, in general, serves the industry on a national level in a manner similar to that in which the state associations serve their membership.

The several USITA committees con-

cerned with matters of general interest to the Independent segment of the telephone industry are composed of public spirited Independent men from the small and the large companies. They serve for the benefit of all, without remuneration for this valuable service.

Intercommunication and Interrelation

AMONG THE FEATURES of the communication industry in our country—and no doubt contributing to its pre-eminence—is the very successful integration and interrelation of the many separate communications companies. Since it is important that the customer do not experience differences in the grade of service on the business handled jointly by different companies—sometimes several of them—it follows that Bell-Independent relations are of great importance. Bell relations with the Independents

A modern cordless PBX switchboard is another Independent product.



may be divided into three broad major categories:

(1) *A mutually satisfactory division of responsibilities, ownership of facilities, and division of revenues received from joint business.* This involves a number of communications services; primarily, however, joint long distance business, short and long haul. Other services jointly rendered by the joint use of facilities include private line, teletypewriter exchange, radio and video networks; mobile service, extended area service, foreign exchange service; and the special requirements of railroads, pipe lines, and utility companies and the military;

(2) *Coöperation and assistance in furnishing, maintaining, and improving service on joint business and on facilities used jointly.* Such coöperation and assistance is a factor not only in the techniques, prac-

Providing service to pipe line companies is a joint undertaking.

tices, and procedures of construction, maintenance, and operation, but also in long-range planning, cut-overs to dial, establishment of special services; in commercial, accounting, and rate matters; and in public relations. These activities involve also comprehensive assistance to the many smaller companies—including, frequently, the encouragement of mergers with other Independents to create a larger and more profitable operating unit. The joint use of the latest communication technique, microwave channels, poses some interesting and challenging problems.

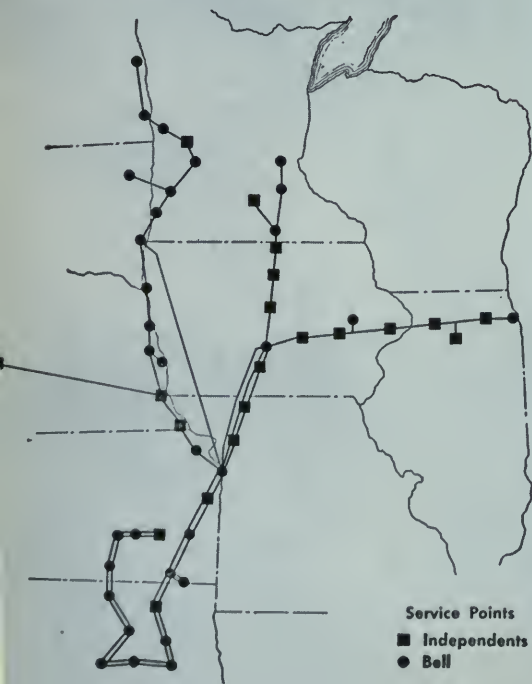
(3) *Coöperation in extending service to rural and other areas not now adequately served.*

In each Associated Company of the Bell System, a small group of experienced specialists devote their entire time to matters concerning relations with the Independent companies, and coördinate interdepartmental contacts between Bell and Independent companies.

Present-Day Problems

THE PROBLEMS of the Independents are, as one might expect, largely the same problems as the industry as a whole, and include such things as taking care of the continued huge demand for service, improving telephone development in rural areas, using the investment dollar where it will do the most good, obtaining adequate rates, financing, gaining public understanding and confidence, improving service, and attracting good career men. Other problems are the adoption of new techniques and increasing mechanization. An important and challenging problem, looking well into the future, is preparing for operator and customer direct dialing over longer and longer distances to the day when the customers of

NINE STATE PIPE LINE INTEGRATED
TELEPHONE - MOBILE RADIO NETWORK





A sturdy H-fixture open wire river crossing of an Independent Company.

most companies will be able themselves to dial any number, anywhere in the United States and Canada.

In the Independent industry, however, possibly the most pressing problem is the very small Independent. As previously mentioned, there are today roughly 3,600 telephone companies which operate less than 500 telephones each! To prosper, a telephone company, in this electronic age, must have full-time experienced management and high-grade modern equipment to provide a first rate, flexible, broad, modern communications service. Companies with less than 500 telephones frequently find difficulty in meeting the demands of their customers for a modern and complete service.

However, there are means to assist them, and many to provide such assistance: the Bell and larger Independent companies and the Independent associations. Most of

the associations have special committees for this purpose. Local and some large city banks are prepared to provide short-term construction loans, while several insurance companies and the Rural Electrification Administration stand ready to make available long-term loans. Mergers with other Independents and integration of properties are, for many small companies, perhaps the most effective means of assuring profitable operations.

A little more about "assistance committees" may be of interest. Usually a special committee of each state telephone association is organized to head up the activity. The state committee in turn organizes regional or district committees to assist the smaller companies in several regional or district areas. In some cases, Bell companies, when requested, have participated in these activities. The committees' assistance involves, first, a survey of essential in-

formation concerning the smaller companies, covering such matters as management, ownership, rates, earnings, financing, plant and equipment, operating procedures, customer and public relations, territory served—and anything else that might affect the smaller company's operations from the standpoint of what is needed to assure a reasonably profitable going concern rendering satisfactory service to its customers and in a position to meet the demands made upon it for additional service.

The Future is Bright and Big

THE FUTURE for the Independents is bright—and big. It is reasonable to expect that the number of telephones operated by Independent companies, the number of long distance messages originated, and the rev-

enues from these messages will increase in about the same manner as in the Bell System companies—especially due to the accelerated growth in the rural areas comprising the greater portion of the territory served by the Independents. The Independent companies individually will no doubt be larger and financially healthier. No doubt also they will have further mechanized their operations, broadened the scope of their service offerings, and received full recognition by the public of their existence and importance. And this healthy expansion of the Independents will present further fields of coöperation with the Bell System—and a stronger, healthier, still more progressive, flexible and dependable telephone industry in the United States.

Cable Pattern



Laying of the transatlantic telephone cable this Summer brings to mind the laying of the first transatlantic telegraph cable nearly a hundred years ago. As one consequence of the great interest in the earlier event, glass was manufactured in the United States in the 1860's in what was called the cable pattern. This compote is an example.

2500 sketches, measurements of 2000 faces, breadboard models, and lacquered sculptures were some of the steps which contributed to the present instrument

DESIGNING THE TELEPHONE

"We bear in mind that the object being worked on is going to be ridden in, sat upon, looked at, talked into, activated, operated, or in some other way used by people individually or en masse.

"When the point of contact between the product and the people becomes a point of friction, then the industrial designer has failed.

"On the other hand, if people are made safer, more comfortable, more eager to purchase, more efficient—or just plain happier—by contact with the product, then the designer has succeeded."

*So writes industrial designer Henry Dreyfuss at the beginning of his new book "Designing for People."** And when he speaks of the object being "talked into," he knows whereof he speaks—for he is the designer of the "500 set," so called (and what a pity his design couldn't have included a better name!). His account of how the telephone got its new look forms Chapter 7 of the book, and we are permitted to reprint it here—with some necessary deletions because of space limitations—through the courtesy of Mr. Dreyfuss and of his publisher, Simon and Schuster. EDITOR.

OF ALL THE MAGIC of modern civilization, the telephone seems to me the most wondrous achievement. How easily we take for granted that the simple, commonplace spinning of a dial will enable us to talk privately and intimately with a particular person across a city or a continent or an ocean or on a speeding train or a ship at sea or in an auto or a plane several miles in the sky. We assume that the telephone will be there, within reach, in time of stress, to reassure one's family and friends or to transact business.

This assumption is not necessarily an expression of smugness or a feeling that our society is especially endowed, but rather a testimonial to the wonderful democracy of the telephone. It is available alike to

millionaire and reliefer. It can be found in stock exchange and boudoir, in saloon and hospital. It has permeated our daily activity and become a personal thing, like reading a letter, and a habit, like brushing the teeth. A child uses it before he learns to read. People unhesitatingly call Washington, New York, Paris, or London.

Other scientific and engineering feats may be more spectacular—the Golden Gate bridge, the Mt. Palomar telescope, this country's fantastic radar screen, the supersonic jet bomber—but they are things apart. People do not live by them as they do by the ubiquitous telephone.

* *Designing for People*. Copyright 1955 by Henry Dreyfuss. Simon and Schuster, Inc., New York.

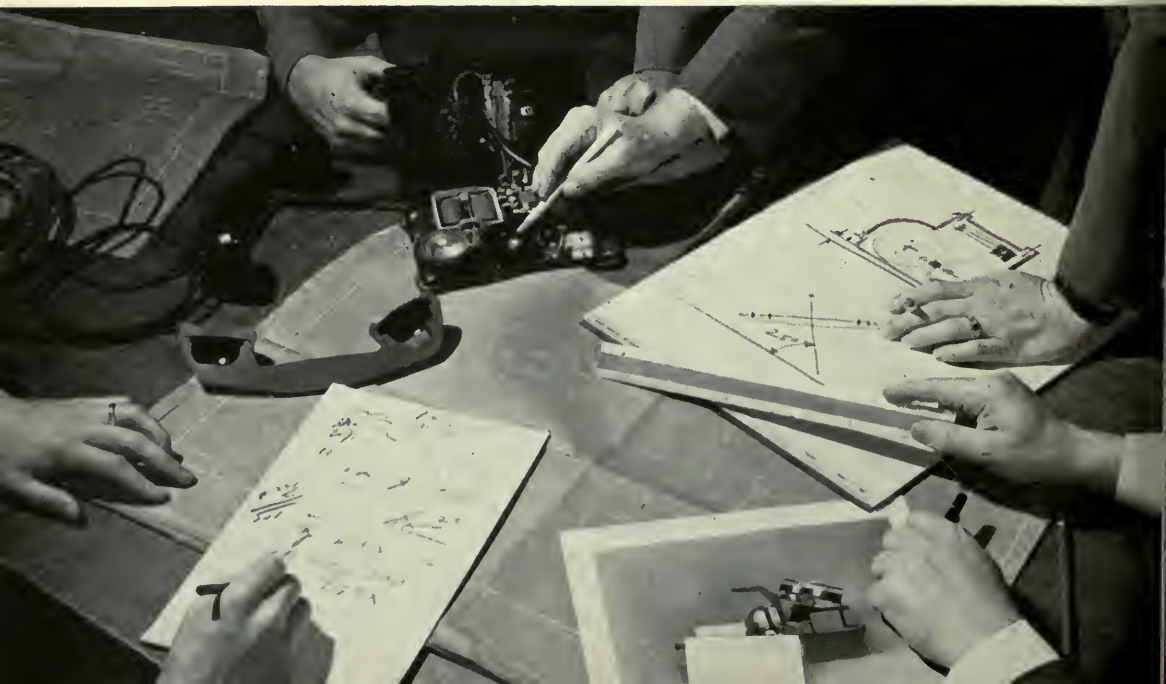
RECENTLY my plane was delayed for several hours by bad weather on a transcontinental trip, and as soon as it landed I rushed to a phone to relieve any anxiety my wife might have had. She calmly told me she knew the plane was going to be late. She had been on the telephone constantly, and the airline people had kept her informed of weather conditions and the progress of the plane. The incident recalled the "widow's walk" of New England. These were flat areas, with a railing, perched on the gabled roofs of old houses in fishing villages such as Nantucket. During storms, worried seafarers' wives paced these walks, looking out to sea for a glimpse of their husbands' ships returning to port. In a sense, the telephone is a kind of modern "widow's walk." A recent check disclosed that an average of 71,000 telephone inquiries about the weather are made daily in New York City. When storms threatened, the calls sometimes reached 270,000.

There are now more than 50,000,000 telephones in operation in the United States. Of this number, the Bell System provides

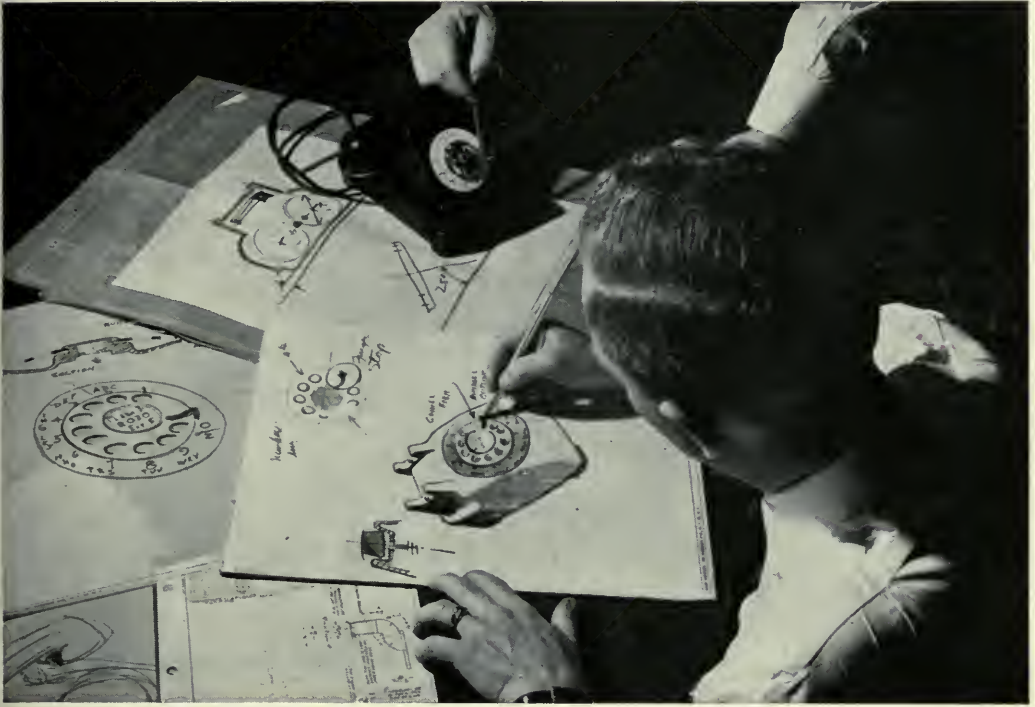
service on 41,350,000. The rest are served by Independent operating companies substantially all of which have interconnecting facilities with the Bell System. The average subscriber makes 5.5 calls daily—a total of 275,000,000 calls every twenty-four hours. The average length of each conversation is 5.35 minutes, which means that Americans spend 1,471,000,000 minutes or 24,500,000 hours on the telephone every day. For a busy people, this certainly seems excessive. It is difficult to imagine that there can be that much of importance to talk about. Certainly, here is proof that Americans like to talk about little things as well as big things. Here also is an indication of the responsibility the telephone company feels in giving its subscribers an efficient telephone.

Before industrial design as we know it today was appreciated in most businesses, the telephone people had recognized that utility alone was not enough. In 1930, shortly after I opened my office, a representative of the Bell Telephone Laboratories called on me. He graciously dis-

This is what it's all about.



Designing the Telephone



There has to be a basic design.

played no uneasiness over my office furniture—a borrowed card table and folding chairs—all I could afford at the time. His mission was to inform me that the Bell Laboratories were offering thousand-dollar awards to each of ten artists and craftsmen for their conceptions of the future appearance of the telephone.

It was flattering to be included in such a group, and the prospect of a thousand dollars was attractive. But I suggested that a telephone's appearance should be developed from the inside out, not merely created as a mold into which the engineers would eventually squeeze the mechanism, and this would require collaboration with Bell technicians. My visitor disagreed, saying such collaboration would only limit a designer's artistic scope.

Several months later he returned with a changed point of view. He admitted

frankly that the telephones of the future submitted by the ten commissioned artists had been unsatisfactory. Some of them were quite original, he said, but all of them were impractical. Now he wanted to hear my ideas about design from the inside out. Our conversation led to an association that has proved eminently satisfying. No one could have been more co-operative than the Bell engineers have been through the years, or so patient and understanding.

TODAY THE CONVENIENCE of telephones is established, and they occupy the most accessible place in the home or office or store. Twenty-five years ago some people weren't quite sure where to put them. They were sometimes kept inside plaster globes of the world or cabinets or dolls with fluffy skirts. Because placement had a bearing on design, we had to determine what people

did with phones, and that is why the telephone company permitted me to act as a repairman's helper when he went on his rounds. My research ended abruptly when I went up in the service elevator of an apartment house and was ushered through the kitchen into the living quarters of a family I knew. There my hostess of a previous evening greeted me in some confusion and seemed surprised that a man who had represented himself as an industrial designer should be repairing telephones.

The telephone for which the Bell people were seeking a new appearance combined several features. After long development, the most serious operating faults of the so-called "French" phone or handset had been overcome. The resulting combination of a handset with parts of the old stand-up phone had produced the early cradle-type instrument. The proposed design, with smaller components housed within the instrument, would eliminate the box on the wall that held the ringing apparatus. In the final design, plastic was substituted for the metal housing. This is the type of phone in general use today.

Eight years ago the Bell people again began to discuss with us their ideas for another new telephone instrument. They wanted improved sound, volume, comfort, dial mechanism, new materials—in short, a new design. This was the beginning of what became the 500-Type Telephone Set—the instrument now being installed all over the country—and the start of another long collaboration between the Bell engineering staff and our office, involving a mountainous file of data and incalculable testing.

In seeking a new telephone appearance, the Bell people were confronted with a consideration in which the user was not primarily involved. The form had to be classic so that it would not be out of place with shorter-lived objects in homes and offices either at the time of introduction or twenty years later, the estimated life span of the instrument.

THIS IS A GOOD PLACE to point out that designing a telephone is not quite the same as designing a clock or a vacuum cleaner or a radio. In the accepted sense, there is no

A third dimension gives some idea of how it should look.





A model is checked for size.

consumer sales problem. Telephone subscribers do not buy their telephones; they use the instruments the Bell System makes available to them because telephones are part of the integrated over-all service that they purchase from the telephone company. Yet salesmanship of the highest order is still involved. The Bell System owes much of its growth to its acute awareness of public relations and its alertness to the subtleties in the relationship of men and machines. The telephone people want each piece of equipment to be an ambassador of good will. They know the subscriber will be pleased, perhaps subconsciously, when he finds the handset grip is more comfortable than the old model and that the voices of his friends are transmitted more clearly.

Toward this goal, we proceed slowly, discarding more innovations than we accept. We have to consider that phones are used not only on desks and tables while people are sitting, but also on counters and shelves for stand-up use. We have to give

critical consideration to room lighting and to arm, wrist, and finger angles and motion in the dial operation.

Maintenance, always a factor in a new design, did not present too great a problem in the 500-Type set, as the maintenance record of the old instrument had been excellent. Nevertheless, to permit a greater degree of accessibility for repair, etc., Bell engineers fastened all components to the base plate. Previously, some of the components had been fastened inside the cover and others on the base plate.

The handset was re-engineered by the Bell people for better performance. Data in Bell files on the measurement of two thousand faces, to determine the average spacing between mouth and ear, were re-examined and interpreted in terms of a new instrument. Every conceivable kind of handgrip was considered—triangular in cross section like its predecessor, square, a thin rectangle, a thick rectangle, and many mongrel forms. The final selection

was the thick rectangle, slimmed down. In comparison with its predecessor, it was smaller, lighter, more comfortable, resisted turning in the hand, and looked better.

Drawing on years of experience with the dial number plate used on coin collectors in public telephone booths, Bell engineers expanded the existing three-inch dial of the desk telephone set to four and one quarter inches, the letters and numbers were placed outside the finger wheel, and the white characters were molded in black. (In the old dial, black letters and red numbers were printed on white under the wheel.) With the new placement, dragging fingers and pencils could no longer deface the characters, the flickering effect of the spinning wheel was eliminated, the characters could be made larger, the dial was easier to clean. Laboratory and field tests by typical telephone users under typical dialing conditions have pointed up these advantages.

Once Bell engineers established the basic position for the handset and dial, the phone began to fall into shape. This is an easy way of stating that something like 2500 rough sketches were scrutinized and narrowed down to half a dozen. Curiously enough, the first form conceived for the new combined set was generically the same as the form finally accepted.

IT WOULD SERVE NO purpose to confound the reader with the infinite mass of statistical detail that had to be carefully studied, the suggested changes that were agreed upon, rejected, or modified, and the compromises effected between engineers and industrial designer. Inherent limitations dictated much of the design. The bell, for instance, had to be placed at the rear because, as the largest component, this was the only area available.

Our office was in turmoil for weeks over what was called the "ROH Battle"—receiver off hook. The telephone company has a pronounced distaste for hang-up errors—the subscriber should properly replace the handset on the cradle, so that the plunger buttons do not remain up, thus keeping the line closed and unavailable for subsequent calls—and lengthy discussions were held over whether two or four prongs on the cradle lessened this possibility.

Early designs of the new housing were unsatisfactory on two counts. They were too high, appearing taller than the old model, and the cradle prongs took away the sleek appearance that was desired. After renewed analysis, Bell engineers found that the housing could be lowered an important one eighth of an inch. Our contribution was optical. By making small changes in the shape of the housing, the position of the light reflection was changed, thus making the instrument *look* even lower.

Sketches were made of all these variations, then accurate layout drawings. These were followed by full-size "bread-board models" of the components. When several designs appeared likely, they were modeled in clay, which can easily be modified as ideas develop. Later they were cast in plaster, sculptured and lacquered. This high polish was important so that the model could be analyzed for light reflection that might prove annoying or tiring. Some were equipped with mock components such as handset dials, cords, and number plates to simulate the finished product. When all decisions were made, a bronze master was made of the final design. From this, the finished housing evolved, made of cellulose acetate butyrate.

The task has not ended there. The telephone family is a large one. Commercially,



Designer to clients—"How do you like it?"

not only telephone sets are involved, but also switchboard facilities and related installations. The new design also made allowance for special types of telephones—hard-of-hearing sets, four- and six-button sets, and two-line single-button sets, to permit interoffice communication and extended service. Some of these functions can be incorporated into the standard housing design, but special variations will require modifications.

In recognition of the increasing use of color in the decorative schemes of homes and offices, the 500 Set has been made available in a range of colors, although the familiar black will long be with us.

THE NEW TELEPHONE is already in many homes and offices, and the Bell people and our staff are very proud of it. It represents eight years of heartening and rewarding cooperation between Bell administrative, engineering, research, and sales personnel

and our office. It is a tangible monument to integration. The lesson we all learned in contributing to a new and better telephone instrument was that not all parts of an old design need be changed for the sake of change, that some parts have proved themselves through years of use but that better devices, techniques, and materials may justify a change. One of these is the bell, which has a four-position volume-control wheel under the base plate, permitting users to select the bell volume they prefer.

It is inescapable that a sense of urgency be attached to a ringing telephone. It may be merely someone calling to accept an invitation to a birthday party, but it may also be an emergency that could affect lives. Perhaps it is wise to consider a telephone call in its proper perspective. It is relatively meaningless when a sixth-grade student calls a chum, and they do their homework jointly over the phone. But it may affect the future of the world when a president calls a prime minister.

HEADQUARTERS SUMMARY

March 15 to
June 15, 1955

IT HAS BEEN the practice in flood areas to remove station equipment before the flood waters arrive and to replace it after the waters have receded, to prevent damage to the equipment. Some time ago, at the request of Ohio Bell, arrangements were made for the provision of a waterproof housing which could contain a standard station jack and withstand water pressure when submerged. The Ohio people felt that if a portable telephone was provided in each residence subjected to floods, the customer could remove the telephone and screw on the watertight cap of the housing. When the flood waters receded, he would reverse the procedure, restoring telephone service without awaiting the arrival of the Plant craftsman and equipment.

Approximately 2,000 of these watertight housings were installed by Ohio Bell in towns subjected to periodic floods. Last October over 300 of the housings were submerged by a flood. In all cases the customers removed their telephones (or moved them to temporary jacks in safe locations) during the flood period. In those cases where the jacks were submerged, no service reaction was experienced. Comments from the customers and Plant personnel in the areas affected were very favorable.

AS PART of the continuing study to improve the safety of telephone workers, a trial lot of nylon fluorescent flags has been made available which will provide a more effective warning to traffic at work locations along streets and highways than the present standard warning flags. These bright red flags have a somewhat shorter life, but they are more visible than the present standard flags even after fading and loss of fluorescence has occurred.

As another safety measure, a high visibility orange enamel—for touching up and painting construction apparatus and safety equipment—has been made available in self-pressurized spray cans. The light orange color was selected, with the cooperation of the safety engineers of some of the companies, as representing the best combination of high visibility and pleasing appearance.

WITH THE growth of nation-wide dialing, it is considered extremely important to be able to intercept calls to vacant central office codes and to disconnected, unassigned, or changed

subscriber numbers, in preference to using tones or to the absence of any signal. To aid in meeting this objective, a new inexpensive system which gives a recorded answer to intercepted calls has been made available. It was developed for application in small dial offices, including all types of community dial offices.

THE PROCEDURES that have been in common use for determining ringing limitations over multi-party rural lines have tended to restrain the companies from pushing the sale of additional telephones or ringers for stations served by such lines. These procedures have been reviewed recently, with the result that some liberalizing of the ringing limitations has been proposed. The over-all effect of the new ringing ranges will be to permit a substantially increased number of additional telephones or ringers on multi-party lines.

IN ORDER for the plant engineer to foresee the need for additions to subscribers' cable plant, it is necessary to determine periodically the fills at each diminishing point along the cable route where congestion may occur, as well as at the central office. A simplified method of making these cable relief studies which can be readily carried out by clerical forces is described in a new section of engineering practices. The simplified procedures use microfilm copies of the cable assignment record in conjunction with standardized forms for summarizing and analyzing data.

MANY of the A. T. and T. Company's more than 1,375,000 share owners may have been surprised to find their July quarterly dividend checks in the mail box a few days earlier than expected. In the past, the dividend has been paid on or about the 15th of the first month of the calendar quarter. Now, through a re-scheduling of dividend operations, the payment date for dividends has been advanced to the 10th of the month. However, since the 10th of this July fell on Sunday, the checks were mailed to reach share owners on the 11th.

The record date for dividends (the day on which a share owner's account must be in the Company's records in order for him to participate in the current dividend) has heretofore been the 15th of the last month of the

Headquarters Summary

calendar quarter. Since the company wished to maintain the usual one-month interval between the record and payment dates in order to provide necessary working time for the preparation and mailing of the dividend, the record date also was advanced 5 days, so that for the recent dividend it fell on June 10.

THE A. T. and T. Company has leased the old Wanamaker store building, at Broadway and 10th Street in New York City, providing the Treasury Department with the space needed for handling the prospective new convertible debenture offer which was approved for not over \$650 million by share owners at the April annual meeting. This will be the seventh convertible debenture offer in the post-war period, each of which has required a larger force to handle the work load as the family of A. T. & T. share owners has grown. The contemplated new offer will require a working force of about 1,500 people, including the force of the Rights Agent.

IT IS PLANNED to build two more stories on the four-story A. T. & T. building at 50 Varick Street in New York now occupied by the Stock and Bond Division of the Treasury Department and the Chief Statistician's Division of the Comptroller's Department, along with a small section of the General Service Department. The two additional stories will provide space for future special jobs, for additional Treasury facilities as needed, and for next year's Annual Meeting. The construction work will begin as soon as practicable after issue of the building permit, in order to reach completion on schedule.

A NEW COMPUTER, known as TRADIC (TRANSISTOR-DIGITAL-COMPUTER), has been developed for the Air Force by Bell Telephone Laboratories. Using nearly 800 transistors, this device requires less than 100 watts to operate, as compared to early computers using as many as 18,000 electron tubes and frequently requiring thousands of watts to operate. Besides the transistors, this new electronic "brain" contains nearly 11,000 germanium diodes, which serve as the electronic equivalent of tiny one-way switches. TRADIC can operate flawlessly in planes flying at supersonic speed, and eliminates vacuum tube failure and heat, jet aircraft's greatest electronic problems.

WHEN THE Bell Solar Battery was first announced by Bell Telephone Laboratories, a year ago, Bell scientists had achieved a six per cent efficiency. Today, they have obtained experimentally eleven per cent—an efficiency comparable to that of the best gasoline engines and more than twenty times higher than that of the best photo-voltaic devices available.

HIGH-FREQUENCY PERFORMANCE of transistors has been greatly improved by several modifications of the basic n-p-n junction transistor. External dimensions have been decreased, the p-layer made very thin, and a fourth lead attached. The resulting tetrode transistor is expected to have important applications in high-frequency broadband transmission systems.

SUPPLIES AND MATERIALS from every state in the Union and 19 foreign countries were bought by Western Electric during 1954 for a total of \$678,600,000 paid to 27,270 individual suppliers in 2,958 cities and towns. These purchases include raw materials and assemblies for manufacturing operations, supplies used directly by Western Electric, and supplies bought for use by Bell Telephone companies. New York State suppliers received a total of \$105,976,000, the largest amount last year. California was second, Illinois third, New Jersey fourth and Pennsylvania fifth.

COMPLETION of Western Electric's newest manufacturing location has been announced. Located on a 62-acre site on Lexington Road, in Winston-Salem, N. C., the modern facility provides 625,000 square feet of floor space and employs 4,000 men and women. The new plant is in full manufacturing operation on communication devices for the Armed Forces and Bell telephone companies. It will serve also as headquarters for the North Carolina Works, which includes plants in Greensboro and Burlington.

A Chicago plant that Western Electric has leased since 1951 for the manufacture of military gun directors will soon be handling expanding production of dial central office equipment. The company has signed an additional five-year lease on the building, located on Fullerton Avenue, and will transfer military work being done there to the North Carolina Works.

The Blue Pencil



IF THIS ISSUE's leading article seems unusually long—and it is, space-wise—that but reflects the magnitude and the significance of the enterprise it describes. With two continents and three countries involved, the ramifications—the items both great and small—which had to be kept in mind and in motion were beyond count. From the editorial standpoint, the normal requirements of checking for accuracy were multiplied both by the number of Bell System groups concerned and by the need for broad agreement on points of view. The manuscript was actually flown to England for consideration there—which might (but perhaps should not) be said to be carrying the pursuit of accuracy to great lengths. It's a splendid and dramatic yarn, withal, and not a tenth of it is told here. Perhaps another and final installment will be in order next year, after the second cable has been placed on the bottom and the service is operating.

OUR COVER PAINTING is motivated by the same topic, of course; but it should be well understood that it depicts the final moments of a submarine cable splice on a cable ship, and by no means a splice in the cable aboard the *Monarch*. It couldn't, obviously. It was painted for the MAGAZINE by George Samerjan, who also did the painting of the plaque of Alexander Graham Bell which was the frontispiece of last Winter's issue.

THE LAYING of the first transatlantic *telephone* cable this Summer inevitably brings to mind the laying of the first transatlantic *telegraph* cable. That event of 1858 created a furor which seems almost unbelievable 97 years later. *Frank Leslie's Illustrated Newspaper* of September 11 devoted an entire page of the minute type of that era to a listing of the events of September 1, beginning with services in Trinity Church at 10 A. M.; then a monster parade of 11 divisions of military and civilian organizations, estimated to include about 15,420 persons; and a reception for Cyrus W. Field, the cable's sponsor, in the Crystal Palace which was attended by "at least" 10,000 persons. A mammoth display of fireworks that evening set fire to City Hall and burned off the cupola,

but that seemed not out of keeping with the general excitement of the day.

The reason for all this probably lay in the real importance of the cable. For at one stroke it linked England and the United States with the speed of electrical communication. No longer were news, people's messages, the world's business dependent on ships for transportation. The cable was an emotional as well as a physical tie that bound, and the celebration expressed what the people felt.

Unfortunately, it was all an enormous anticlimax, for transmission over the cable failed that very day. Field promoted another cable, which broke in mid-Atlantic, and, indomitable, a third, in 1866, which succeeded, and justified all the vision, the courage, the hope, and the money which went into the venture.

TODAY'S PROJECT has its roots in those past events, of course, and links with those earlier days are not lacking. Field sold what was left over from his first cable to Tiffany and Company, New York jewelers, and the latter cut it up and sold short pieces as souvenirs. These, with certificates of authenticity signed by Field, were immensely popular at the time, and some still exist in museums and probably in drawers and attics of old residences. Their current scarcity is attested by the year-and-a-half it took a Long Lines man to lay his hands on one. This same individual, RICHMOND B. WILLIAMS, who had much to do with the preparation of our cable article, also called attention to the cable pattern in glass made in the 1860's, indicative of the deep impression left upon this country by the event of nearly a century ago. We are indebted to him for the picture on page 128 of a compote created in that pattern.

AMID the myriad operations which keep our business running—whether they be the exciting task of conceiving and designing and laying a new kind of cable or the essential routines of billing our customers or ticketing their calls or installing welcome telephones for them—there ought to be time now and again for inspiration: a pause to enjoy a thrill of pride at some splendid accomplishment, or to get

The Blue Pencil

a lift of the spirit from thoughts noble in themselves or nobly expressed. This publication deals in words, of course, and most of them are necessarily pretty matter-of-fact, so we find a special sense of satisfaction when we are able to bring to our readers words they may want to savor, to read twice and linger over and reflect upon, either because of the message they give us or the flavor and roundness with which they voice it.

Two items in this issue have for us that special sort of pleasure—as we hope they have for all our readers.

Mr. Price's guest editorial, complete in unity of thought and expressed in simple terms, tells with sincerity about the high principles which really do guide this business. Dr. Bush speaks of the broad aims which should direct men's lives in amity, but since his whole topic is communications, we telephone people may take his words to our hearts and cherish them. What appears on our back cover is but the last paragraph of his talk, which may be found in its entirety in *Mechanical Engineering* for April, 1955.

Another kind of essay which we have greatly enjoyed appeared in the issue of this MAGAZINE for Spring, 1950—more than five years ago. It was adapted then from a leaflet distributed to its employees by the New England Telephone and Telegraph Company, and we quote all of it, without changing 5-year-old figures—just because we like it:—

"WHAT IT MEANS TO BE TELEPHONE PEOPLE"

"We telephone people travel an unusual road.

"In a nation where big business and little business drive down a fast, competitive highway, we have been leased a private way. To us

the people of the nation have singularly granted a trust and a power.

"In the Bell System there are more than half a million of us, serving twenty-five million customers. On our shoulders alone is the responsibility to give these people the round-the-clock, dependable telephone service they need. In our hands is a power to bind them together in friendship, trust, and common understanding.

"Over our switchboards go their hopes, their fears, their sorrows, their needs. Across our lines they order groceries from the corner store, close business deals, make appointments, send tidings of births and deaths. With our help they summon doctors when they're sick, policemen and firemen when they're in trouble. We have taken part in the shaping of the law, the progress of commerce, the growth of schools, and the courtship and marriage of two generations.

"Since the birth of the industry, telephone men and women have dedicated themselves to the fulfillment of this our public trust. They have developed within themselves and the telephone team a spirit of service and helpfulness that has surmounted fire, flood, and disaster. They have handed down to us a heritage rich with their courage, their loyalty, and their devotion in rendering a service to the people.

"We, the telephone people of today, are vested with the responsibility of carrying on this trust. We will make mistakes, for it is human to err. But in the long run, how we do our individual job, how we bear our individual responsibility, will determine how we achieve our trust. For in the last analysis we do not work for the telephone company. We are the telephone company."



Robert G. Elliott

Whos' Who & What's What

(Continued from page 71)

THE NEW YORK TELEPHONE COMPANY and 1921 were the place and time of HARRY DISSTON's start as a telephone man, and he was successively a district traffic superintendent, a district commercial manager, and a division commercial supervisor, before he transferred in 1932 to the commercial division of A. T. & T.'s O. and E. Department. Here for nine years he ful-

filled various assignments in the commercial results section until he left for active military duty in the Pacific in 1941. Released as colonel in 1946, he returned to A. T. & T., and until 1951 he headed a group concerned with development, revenues, and commercial expense analysis. It was during this period that he contributed "Where Do We Go from Here?" to the Summer 1949 issue of this MAGAZINE. Since 1951 he has been in charge of the group handling Connecting Company matters.



Harry Disston



Our hope rests on the gradual spread of knowledge among men, and on the assumption that with knowledge will come true wisdom. In this hope we depend on the improvement of means of communication and the gradual disappearance of obstacles to their full employment. Thus the subject of our thinking is one of crucial importance. It is one on which the progress of civilization has always rested, and on which it will rest more heavily in the years to come. Any man who works to extend the power and versatility of methods and machines by which one man communicates with another, any man who struggles to bring new ways of communicating into uninhibited effect, can do so with a full conviction that he is laboring for the benefit of his fellow man.

From an address by Dr. Vannevar Bush, President of the Carnegie Institution of Washington and an A. T. & T. Director, at the 75th Anniversary meeting of the American Society of Mechanical Engineers in New York on Feb. 16, 1955. Published in Mechanical Engineering for April 1955.

R.T

Bell Telephone MAGAZINE

AUTUMN 1955



Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.

A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS



Cover: Hurricane Warning. Painted
for this Magazine

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SALVATORE J. TAIBBI, *Art Editor*

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JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

I N T H I S I S S U E

WRITTEN ESPECIALLY for this MAGAZINE, ROBERT H. SIMPSON's article about hurricanes both recognizes the gravity of their menace to every aspect of life in this country's Atlantic area and holds out new hope that eventually they may be controlled. After courses at Southwestern University and Emory University, he joined the U. S. Weather Bureau in 1940 as a meteorologist. In 1945 he became also a technical adviser to the Air Force, and later Aviation Weather Specialist for the Weather Bureau. While directing the collection of research data from aircraft, he has flown with the Air Force into several hurricanes and typhoons from bases in Panama, Bermuda, and Guam. All of which qualifies Mr. Simp-

son, obviously, for his most recent appointment as Director of Project Wildwind, a long-range investigation into the cause and cure of hurricanes.

A MEMBER OF THE Public Relations Department of the Southern New England Telephone Company since June of 1954, LEIGHTON C. GILMAN is now on the staff of that company's employee magazine, *The Telephone Bulletin*. He was on his way home from a vacation in Maine last August when he stopped in Putnam, Conn., to take a few pictures—and stayed there a full week. It is with this background that, at our request, he recounts Putnam's ordeal of fire and flood.

Robert H. Simpson



Leighton C. Gilman





John H. Mitchell

PLAYING A RETURN ENGAGEMENT, even to the accompanying photograph, JOHN H. MITCHELL reports on hurricane damage much as he did in last Winter's issue, to which he contributed "Planning Ahead to Meet Disaster When It Hits." He joined the Long Lines Department in 1946, after two years in the Signal Corps. Experience in Washington and New York preceded his assignment as district plant engineer in Richmond, Va., and it was from that post that he joined the Plant division of A. T. & T.'s O. & E. Department a year ago.

STARTING IN THE Plant Department of the Lehigh Telephone Company in Hazleton, Pa., in 1924, JOHN MARKLE II was traffic manager when that company became part of the Bell Telephone Company of Pennsylvania in 1930. He has held various Traffic responsibilities since that time, including that of general traffic manager in Pennsylvania's Central and Eastern Areas. Mr. Markle has been vice president in charge of personnel since 1950, and the

development of an Institute of Humanistic Studies is a project close to his heart.

THE TWENTY-SIXTH FLOOR of the Long Lines headquarters building in New York, with its view of the world's busiest harbor and the ships from far and near that come and go, is a good place for dreaming dreams with a purpose. Since he joined the Long Lines Department at Atlanta in 1919, HENRY T. KILLINGSWORTH has had various responsibilities concerned with the expansion of voice communication to world-wide range—as predicted by the founders of the telephone business. Plant, engineering, and administrative assignments in Long Lines offices from Denver to New York, with another assignment in Atlanta included, had prepared him by 1949 for an A. T. & T. vice presidency and responsibility for the Long Lines Department, with which he has now spent "going on to" four decades.

(Continued on page 211)

John Markle II





Preparations for Diane were thorough at A. T. & T. Headquarters in New York.

The cause of recurrent natural disasters in the eastern section of this country is being studied intensively, and an effort to develop some step effective against them

THE WEATHER BUREAU SIZES UP THE HURRICANE PROBLEM

ROBERT H. SIMPSON

*Director, PROJECT WILDWIND, UNITED STATES WEATHER BUREAU,
WASHINGTON, D. C.*

IN LESS THAN TWELVE MONTHS, hurricanes have caused more than two billion dollars' damage and the loss of more than 350 lives in northeastern United States. As disasters go, the loss of life, while large, sets no records. But never in history has a natural disaster caused so much damage as occurred during "Carol" in 1954, or subsequently during the floods from "Diane" this year. From the four corners of a nation aroused and alarmed by these experiences, the question is being asked, "What does this mean?—What can we do about the hurricane menace?" The answers pose a challenge not only to the Weather Bureau, which holds primary responsibility for weather and flood warnings, but to the scientific imagination, ingenuity, and initiative of the nation as a whole. Unquestionably there are many important things which can be done. The only question is how far we should go, for the cost will not be small.

The hurricane problem comprises essentially three categories of interest:

1. The forecast problem.
2. The question of hurricane vulnerability.
3. Weather control measures.

It will help us to understand what the possibilities are in dealing with the hurricane menace if we discuss briefly the nature of the problem in each of these categories.

Hurricane Forecasting

THE HURRICANE USUALLY FORMS OVER remote areas of tropical oceans where deep layers of warm air are heavily laden with moisture. Its violent whirling winds are set in motion when air is drained away from one area by currents in motion at high levels, causing pressure at the surface to fall. As air near the surface surges in toward lowering pressure and is deflected (by the earth's rotation) into a spiraling path, it encircles the point of lowest pressure and is forced to rise, while still more air converges from the environment. The heavy



Figure 1: The Carrying Currents for the Hurricane. Hurricanes are born in a great band of east winds known as the trades. In this environment they move westward toward Continental United States, where they curve northward and eventually join the jet stream and its associated belt of west winds. Where the hurricane ultimately moves depends in part upon the latitude at which it forms.

rains which develop in the rising air release latent heat of condensation, the fuel upon which the hurricane depends for its energy and its growth.* The problem of forecasting hurricane formation, then, is mainly one of identifying and anticipating the arrival of conditions which will drain off air at high levels over ocean areas where

a sufficient supply of warm moist air exists. This is an important forecast task, for not all hurricanes form in remote areas. On many occasions, conditions develop which permit them to form close enough to the U. S. mainland to threaten the coast within less than 24 hours.

Forecasting hurricane formation is often made more difficult because of insufficient

* A recognized meteorological phenomenon.

The Weather Bureau Sizes Up the Hurricane Problem

reports to analyze and identify those circulations which cause air to be drained away and surface pressures to fall at critical locations.

Once formed, the hurricane is carried "downstream" by the large river of air in which it is embedded. Hurricanes almost invariably form in a region where trade wind easterlies prevail. Figure 1 illustrates how these trade winds, usually sluggish and slow moving, spread westward across the oceans and split into two branches. One continues westward while the other curves northward to join the great band of westerlies which at the middle latitudes encircle the hemisphere. At the core of these westerlies is a narrow fast-moving current of air which meteorologists call the jet stream,* and which, as we shall see, sometimes plays an important role in redirecting the course of the hurricane. From Figure 1 it is evident that the general track of the storm is in part determined by the latitude at which it forms. If it first appears at very low latitudes, it may move across the Caribbean and Yucatan; if at a higher latitude initially, it will tend to recurve northward before reaching the U. S. mainland.

The schematic pattern of large-scale air currents presented in Figure 1 is typical of conditions at the height of the hurricane season. Unfortunately, this pattern is not dependably persistent. While the movement, both in the trade wind and jet stream regions, constantly tries to return to this typical pattern, there is a continual fluctuation of the channels through which the streams flow. Troughs* in the meander-

ing path of the jet stream tend to move progressively eastward. Partly in response to these basic changes, the location at which the trade winds branch, and also the amount of the current which is diverted northward, varies. At times when the jet stream trough is returning to its customary position on the U. S. East Coast, and the jet is fully energized, it breaks out of its usual channels and surges far southward. As this occurs the trade winds are rolled back and hurricanes along this meridian, even at relatively low latitudes, are snatched up by the jet and propelled rapidly northward. This is illustrated in Figure 2.

THE JOB OF FORECASTING hurricane movement begins with two basic tasks; first, the description or analysis of the large scale air movements which are carrying the currents of the hurricane, and second, the prediction of changes in channel which the carrying currents will experience during the period of the forecast. To do the job properly the forecaster must analyze and maintain a continual vigil of jet stream movements over more than half a hemisphere. Actually the energy sources and impulses which impel the jet stream to surge out of its established channels, as in Figure 2, sometimes are found as far away as mid Pacific. Dramatic changes like those in Figure 2 are among the most difficult to forecast precisely. This is the sort of transition which in 1954 sent Carol reeling northward into New England—400 miles in 12 hours, after dawdling for nearly 72 hours in the more sluggish north branch of the trade winds. This is also the type of forecast problem which has accompanied each of the several East Coast snow storms of recent years. While standard forecast methods can detect qualitatively the onset

* The jet stream is a "tube" of fast-moving air centered near 40,000 feet. As the jet stream proceeds eastward around the hemisphere, it follows a meandering path, deviating to the north around ridges of high pressure and to the south around troughs of low pressure. When intense troughs draw the jet stream far south, hurricanes in its path are swept northward with great speed.



Figure 2: In hurricane forecasting, it is necessary first to describe the channels of the currents which carry the hurricane, then determine what changes in channel will occur during the forecast period. Here the carrying current in the belts indicated in solid red undergoes in 24 hours such radical changes as shown by the channels in lighter color. When this happens, a hurricane which appears likely to move far westward over Florida may be whisked northward into New England with little advance notice.

The Weather Bureau Sizes Up the Hurricane Problem

of these changes, they often fall far short in quantitatively predicting such factors as *how far south* and *in what strength* the intrusions of the jet stream will occur. In dealing with this large-scale aspect of forecasting, the Weather Bureau is counting heavily upon further development of numerical weather prediction methods, using the electronic computer to integrate complex expressions for which only rough approximations have been possible previously. An IBM 701 computer, installed earlier this year in the Joint Numerical Weather Prediction Unit at Suitland, Md., has been used experimentally for this purpose for the last six months.

Unfortunately, in hurricane forecasting, the solution of the large-scale problem is only a first approximation. The reason for this is best illustrated by Figure 3, the track of hurricane Edna, and Figure 4, which

describes the distribution of danger about a hurricane path. The hurricane tends to move in a wobbly path, the geometry of which is as yet undetermined. However, it is of considerable importance that the forecaster be able to refine the general track to compensate for the zigs and zags. A matter of 20 to 30 miles in the point at which the center crosses the coast can mean the difference between the damage resulting from 50-60-mph winds, and the disaster which accompanies heavy inundation from the sea with winds greater than 100 miles per hour. The solution to this and a number of other important problems in hurricane forecasting necessarily depends upon a more complete understanding of hurricane structure and the manner in which energy is exchanged between the hurricane and its environment. With this objective in mind, the Weather Bureau is



Figure 3: The track of Hurricane Edna.

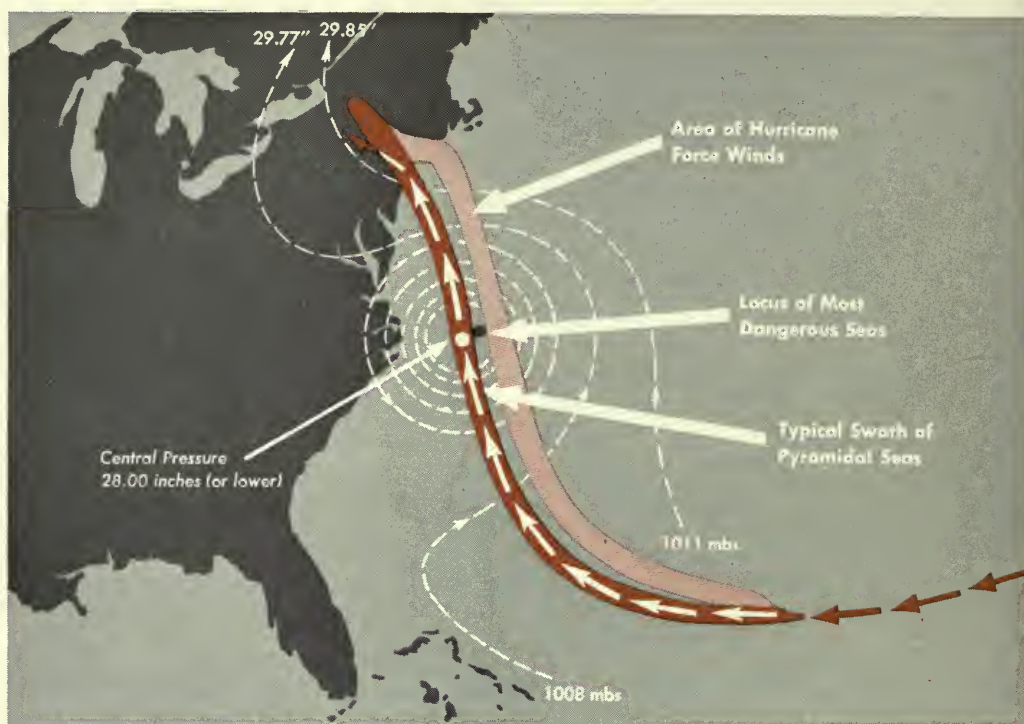


Figure 4: The color bands represent the area of hurricane-force winds of a storm whose center is moving in the direction of the arrows. The area between them includes the most intense winds, and it is here that the dangerous pyramidal seas are generated.

launching an all-out investigation of hurricane structure in 1956, a three-year program to be known as *Project Wildwind*. The Project will use three flying laboratories to probe the hurricane from top to bottom and collect sufficient data to permit the computation of an energy budget for the storm.

Hurricane Vulnerability

PERHAPS THE MOST IMPORTANT QUESTION to utilities, to insurance companies, and to business of all kinds, arising from our recent hurricane disasters is whether or not New England and the middle Atlantic States are becoming more vulnerable to hurricanes. The answer is being energetically sought by the Weather Bureau and by meteorologists outside of government, but this is not an easy question to answer.

First, while an average of about ten tropical storms form in the greater Atlantic each year, the number varies greatly from year to year. Moreover, in some years storms form only during mid-season, while in other years they occur mainly in late or early season. Since carrying currents for the hurricane migrate considerably as the season advances, the analysis is even more difficult.

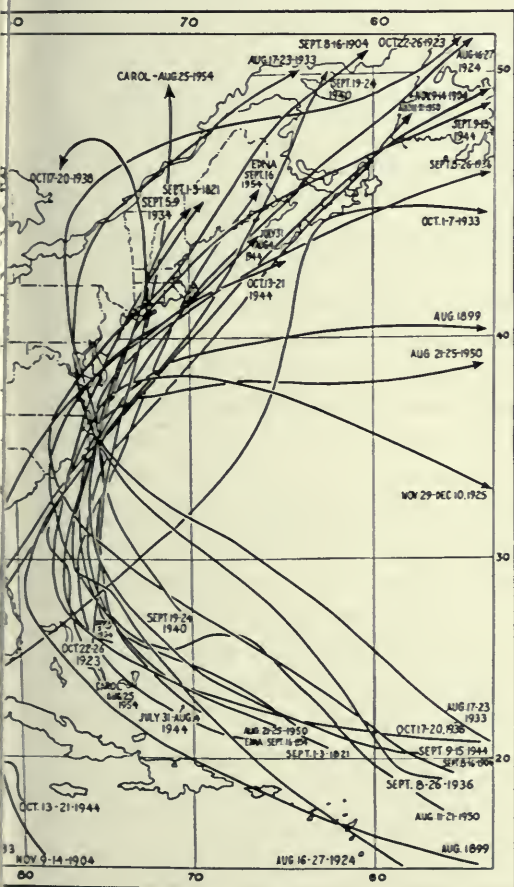
Of the ten tropical storms which form on the average each year, two occur in the Gulf of Mexico, three in the Caribbean, and the remainder elsewhere in the Atlantic. Of those which grow into full hurricanes, only two cross the coast of the United States.

Turning now to Figure 5, there are at least twenty important hurricanes since

The Weather Bureau Sizes Up the Hurricane Problem

1820 which have either directly affected New England or have been near misses. It is interesting to note that virtually all have passed within less than 100 miles of Hatteras in their journey northward. It is of even more importance that a change in course of as little as 10 degrees, as these hurricanes passed Hatteras, would generally have spelled the difference between little damage to New England and serious disaster to that area. It is just such small differences that we are trying to evaluate in answering the questions which have been raised concerning hurricane vulnerability.

Figure 5: Hurricanes since 1820 which have directly affected or come close to New England.



Jerome Namias, Weather Bureau long-range forecast expert, has attacked the problem by concentrating his attention upon the forces shaping the channels of large circulations—such as trade winds and “westerlies”—which carry whatever hurricanes form. His analyses thus far point to an anomalous condition which has developed during the past twenty years in the western Atlantic. Here a rise in pressure has tended to shunt the carrying current from the south into channels which would tend to move hurricanes closer to the New England coast than before. At the same time, the jet stream trough has receded from its normal position near the coast to a position farther westward. These changes may be the result of fortuitous circumstances and the trend may already be returning to normal. Again, they may be a manifestation of progressive changes in climate. If so, we shall probably have to look farther than the northeastern U. S. for complete verification.

There is no agreement among meteorologists about the cause of a changing climate nor, indeed, that it is changing. If one begins with the assumption, however, that these anomalies are a part of our changing climate, then we may ask what sort of changes in available energy would create these anomalies, and where the injection of energy in abnormal amounts would give rise to the observed anomalies. This line of inquiry turns up at least three possibilities:

1. A shift in ocean currents and warmer sea surface temperatures in the western Atlantic;
2. A similar shift in mid-Pacific, or
3. An increase in receipt of solar radiation, causing greater continentality or summer heating of the North American continent.

Another Weather Bureau scientist, Harry Wexler, has pointed particularly to the latter possibility. He reasons that more sunshine is now reaching the earth's surface because volcanic dust from cataclysmic eruptions such as Krakatoa, long suspended in the high atmosphere, is gradually settling out. There is an increasing amount of observational evidence in support of this concept. However, it is important also that a thorough investigation of trends in sea surface temperatures be conducted. The Weather Bureau expects to begin work on this problem in the near future. Meanwhile, there is apparently no conclusive means of determining whether or not hurricanes are going to be regular visitors to the New England coast. In any event, using any climatological yardstick, New England has had more than its share of hurricane visitation in recent years, and even the mathematical probability of another Carol, Hazel, or Diane affecting the same areas within ten years or more is exceptionally small.

The Weather Control Problem

WITH LOSSES FROM HURRICANES exceeding two billion dollars in less than twelve months, the question of controlling the formation or modifying the behavior of hurricanes is one which must receive the most careful attention. There is no reason to believe we cannot find how to make hurricanes behave. It is not likely to be an easy job, however, and without question the research and development required would place the undertaking in a class with the Manhattan Project.

To begin with, it is well to ponder the simple fact that *a hurricane the size of Edna, 1954, expends more energy in one minute than is developed in electric power by all generation sources in the United*

States in fifty years! To manhandle a system of such strength as this, it will be necessary to locate its "Achilles heel"—if it has one—and find a means of trampling on it. Evidence from data gathered in the past two years suggests that there is reason to believe the hurricane may indeed have an Achilles heel where the application of a little energy will accomplish a large amount of work. The hurricane does not operate in steady state as a well governed machine. It is a massive area of imbalances in which a majority of the motions are accelerative. It is not a closed system in which the same air continues to circulate through the machine. Moreover, in Nature we see spectacular things happen to hurricanes in short periods of time—great changes in intensity and important changes in direction of motion without clear evidence of large changes of input energy to the storm.

Nevertheless, it would almost seem to be folly to apply at random the so-called shotgun approach to research on hurricane control. The atom or hydrogen bomb, random cloud seeding, or other means used under conditions which offer little means of evaluating in advance the probable effect, or of later assessing the actual results, are haphazard—if not desperate and potentially dangerous—approaches to a scientific problem. The only sound approach is to determine first the intimate details of hurricane structure which will permit a systematic search for the Achilles heel. Then will be time to begin our experiments in disciplining these great storms.

Project WILDWIND, with its special aircraft probings of the hurricane vortex beginning July 1956, should go a long way toward providing information on storm structure which is essential in developing an intelligent all-out program of research and development on hurricane control.

*Diane's flood wrecked a typical New England community
—one of many—whose telephone service was among the
first essentials to be restored to its stricken people*

PUTNAM LIVED TO SERVE ANOTHER DAY

LEIGHTON C. GILMAN

*Public Relations Assistant, THE SOUTHERN NEW ENGLAND
TELEPHONE COMPANY*

Telephone plant in six northeastern states was devastated last August by floods which were the wicked step-sister of the hurricane called Diane. Though the pattern differed in each community, the cause was basically the same: torrential rains which turned streams and creeks and rivers into devouring monsters hungrily consuming people, bridges, buildings, highways—and anything else that stood in their erratic way. Central offices elsewhere were flooded out, of course; but we may let this vivid report of how the situation was met and overcome in Putnam represent the courage, the resourcefulness, and the will to serve which have won out everywhere over a disaster ranked as one of the century's worst. EDITOR.

FOR THE 10,000 RESIDENTS of Putnam, 1955 will go down in history as a year of disaster. Putnam's centennial celebration turned into a period of destruction—destruction caused by flood waters of the Quinebaug and French Rivers, which merge just north of this quiet textile city in the northeast corner of Connecticut.

After a joyous centennial celebration, Putnam was just returning to normal when the flood came, on August 19. Explosions and fires came with it. A magnesium plant

exploded, sending mushrooming clouds of an atomic-like blast into the sky. Two textile finishing plants burned the following night, again lighting the sky with noontime brightness. But it was the floods that did the most damage: more than twenty-five million dollars' worth. About 12 inches of rain, one-third of a normal year's rainfall, fell in 24 hours.

So rapid was the rise of the waters that most people had little chance to save anything more than their most prized posses-

sions. In some cases, not even these were salvaged. Fortunately, Putnam suffered no fatalities as a result of the flood.

The Putnam exchange of The Southern New England Telephone Company served about 7,100 telephones in Putnam and several outlying areas. Dial service was introduced in 1951. Although toll-centered on Danielson, a few miles south, it was the test and assignment center for Danielson and Moosup. The new one-story brick building housing plant and commercial quarters was located on Main Street.

FRIDAY, AUGUST 19, was a day not unlike any other rainy summer day. No one at the Putnam office realized the area was endangered. Radio reports said some communities in Massachusetts were flooded, but there was no report of danger for Putnam.

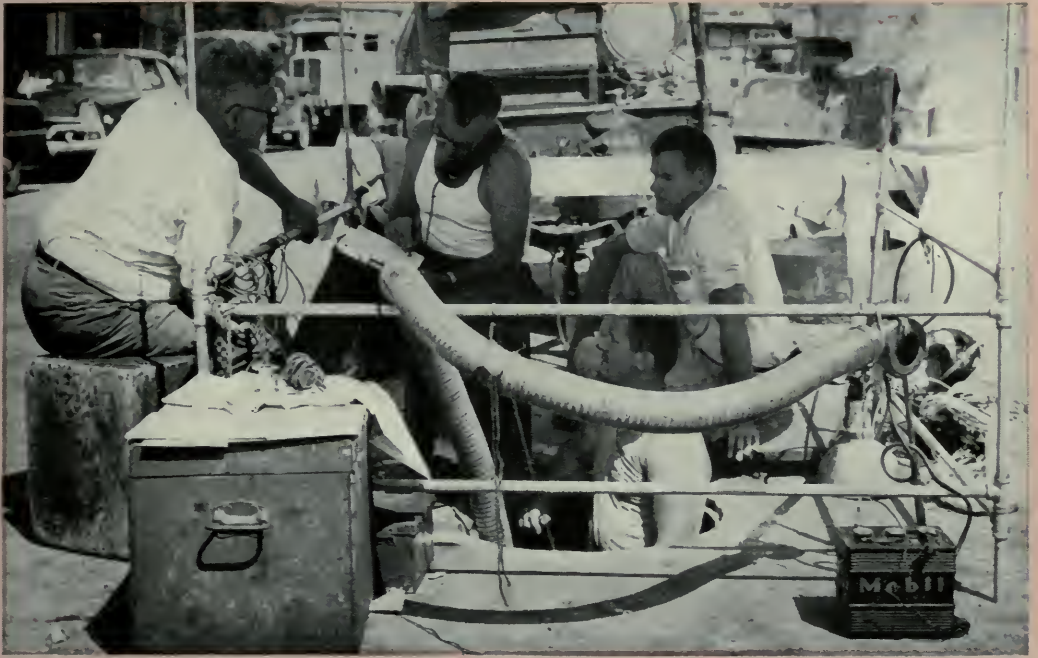
By 10 a.m., however, the situation had changed radically. Police alerted people in downtown areas. As the Quinebaug River rose, Plant Service Supervisor Elmer Cole ordered sandbags placed around the office. One plant man said the water came down Main Street so fast he didn't have a chance to tie a sandbag he had just filled. "I just left it there and ran," he adds.

Less than an hour later, two service representatives had to be carried out by plant men wading through the street in hip-deep water. "We were just putting records and cash away when we looked out and found ourselves marooned. The water was coming down the street as if it had just broken through a dam," said one.

Plant men, including outside forces from Danielson, were busy trying to keep the city's telephones in working order. After commercial power failed at 11:50, the of-

While the Quinebaug River still raged, a 1200-pair cable replaced the cable which had been carried under the destroyed bridge.





The cable to Danielson, tapped at this manhole, provided emergency service locally and a link with the outside world.

Outdoor telephone booths were busy spots during the 100 hours Putnam was without regular service.



An emergency PBX was installed in the former telephone building to provide service for disaster agencies.



First entry into the central office, about 24 hours after the flood hit.



This is the mess of muck left in the business office.

Left, below: Eugene S. Loughlin, chairman of the Connecticut Public Utilities Commission and a former president of the National Association of Railroad and Utility Commissioners; J. Raymond Ryan, general plant manager of the Southern New England Company; and author Leighton Gilman inspect flood pictures in Putnam. Right, below: A new test bureau was quickly improvised after flood waters reached almost to the top of the local test desk.



fice ran on auxiliary generators until 12:16. Then water rushed into the basement and knocked out the emergency equipment.

"We were trying to get all the records and movable equipment off the floor," says Foreman of Installers Sands Fish. "Then there was a rumble in the basement. The water came in with such force that it tore a partition down."

When every conceivable precaution had been taken, Mr. Cole ordered complete evacuation; the office had to be abandoned.

As several outside plant men were waiting for the last evacuees from the office, screams were heard from the furniture store next door, where three people were stranded. Without hesitation the telephone men formed a human chain through the raging waters to the store. "The lady was so scared," said a lineman, "that she held on to me with a death-like grip. She couldn't say a word."

Similar cries were heard a few minutes later from a foursome trapped in a stranded automobile a few hundred feet up the road. Again the crew formed a line, this time in even deeper and faster water. To these men, rescuing seven persons was nothing exceptional. "We only did what anyone would have done," they said.

DURING THE NEXT 24 hours, even though flood waters prohibited entry into the downtown area, telephone people were in action. Realizing the scope of the disaster, engineers and plant supervisors at the company's headquarters in New Haven formulated detailed restoration plans. Specifications were drawn and equipment was ordered so work could start as soon as it was safe to enter the building.

Meanwhile, in Putnam, mobile equipment and coin telephone booths were being installed to handle emergency calls. In

less than six hours, the Putnam-to-Danielson toll cable was tapped and working circuits were connected to emergency public telephones. The Day Kimball Hospital, across the river from the center of town, was served by mobile radiotelephone equipment by nightfall.

As a precautionary measure, a nine-position No. 10 switchboard, in moth balls for several years, was shipped to Putnam. To house this manual office, blueprints for a second-story addition were made, contractors were hired, lumber was purchased, and operators were recruited.

In an effort to save the dial equipment, our engineers advised that it be hosed down, blown out with compressed air, and finally dried with infra-red lamps, fans, and heaters. This, they had learned from Bell System experience in other floods, was about the only way to salvage equipment so badly covered by mud and silt that it was hardly recognizable.

Over night, Putnam became a major center of telephone operations, as people from all departments converged on the small city. Supplies and equipment of all kinds were shipped in on emergency schedules; some were flown in from Western Electric plants as far west as Lincoln, Nebraska.

With these same supply trucks came food, water, and medical supplies. Company Nurse Dorothy Schmidt from New Haven inoculated 200 people against typhoid. Other shots were given for tetanus. With the city's entire water supply polluted, water was shipped in, gallons upon gallons. Food, too, was a scarce item.

Plant Health Counselor William Nicoll had the Herculean task of finding rooms for about 150 people. "That, in itself, was a full-time job. We had to rent complete tourist homes, motels, and hotels. We even used several private homes," he reports.

By Saturday noon, flood waters, which rose four and one-half feet in the switch room, had receded enough so it was possible to enter the building from a Coast Guard boat. Foreman of Central Office Repairmen Lester Stradley, the first through a window, said, "I was just flabbergasted when I put my foot through that window. It got stuck in the mud. I had imagined a mess, but nothing like this."

WATER WAS STILL knee-high in the building when the East Putnam Volunteer Fire Department began pumping fresh water from a 2,700-gallon tank into the office to hose down the muddy switches. A Putnam central office repairman reported, "wood, paper and all kinds of other junk were floating around us."

Later on this hot, sunny afternoon, house service men and contractors were shoveling out tons of mud and silt; construction crews were setting poles; and work was progressing on the new manual office. A new business office had already been set up at the former telephone building on higher ground. The present owner of the building told local Manager William Johnson, "Take it over whenever you want. We'll worry about the rent later."

Before the day was out, Putnam had operators for the first time in four years. A two-position manual PBX was connected to the Danielson toll cable so fifty important organizations and individuals could have emergency service. Miss Ruth Shaw, assistant chief operator in Danielson, assumed her former role of Putnam chief operator. Traffic headquarters were in the rear of the "new" business office.

Meanwhile, the Danielson switchboards, manned to their capacity since the flood struck, were swamped with calls. Officials

transacted pressing business, and calls to loved ones spread good—and bad—news.

Commercial sales people had already visited business customers whose premises were badly damaged. When the condition of customers' premises would not permit restoring service for several days, they were offered, without charge, a central answering service for calls coming in to their telephone numbers. PBX installers and repairmen were also working long hours helping to speed industry's recovery by prompt restoration of service.

Work at the central office had to be halted abruptly about 8 p.m. Saturday when it was feared that an upstream dam might give way. By daybreak Sunday, however, operations were resumed.

WHAT TRANSPIRED in those daylight hours of Sunday was almost unbelievable. By sunset one could walk through most of the first floor of the telephone office without boots; the new second story had part of its roof; adequate emergency service was available to Putnam citizens; and the long, hot, tedious task of drying out the step-by-step dial equipment was well under way. New business office records had been prepared by a group of directory and other headquarters people from the accounting records in New Haven. Since cables carried on and under bridges had been severed by the flood waters, a 1,200-pair aerial cable was placed above the river to join once again the East and West sides of Putnam.

In the telephone office, infra-red lamps, fans and heaters, ladies' hair dryers, and air compressors—all powered by auxiliary generators—were used. Splicers' manhole heaters and blowers provided an additional source of heat at a time when the mercury outside was over 90. The office



The East Putnam Volunteer Fire Department supplied fresh water to hose down the central office equipment.

Left, below: Hosing operations were begun while flood waters were still knee deep in the switch-room. Right, below: Hair dryers proved very effective in drying out step-by-step equipment.

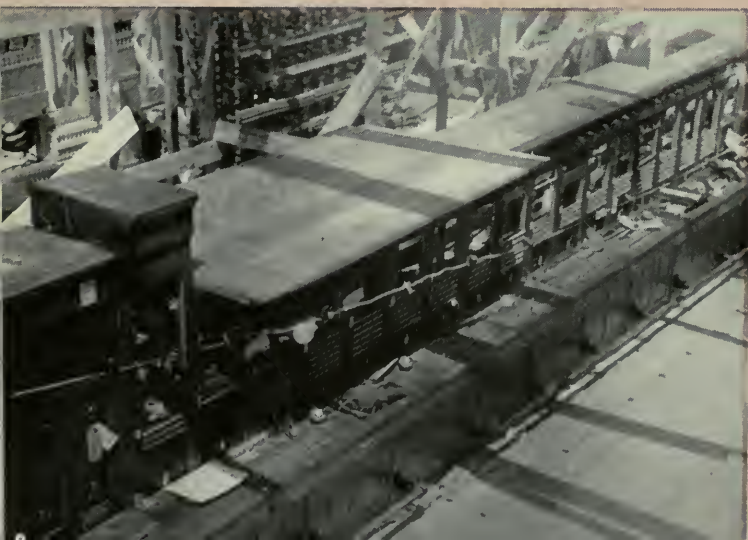




Emergency generators were rushed in to provide power for the telephone office.



Infra-red lamps were used to dry switches while Western Electric men installed new equipment.



Opposite: The day after the flood, work was started on a second story to house a nine-position manual switchboard—which soon proved unnecessary because of the swift restoration of the dial equipment. Left: Even before its protective housing was completed, the switchboard was in place on the roof of the office.

presented a picture of mass confusion, yet each man knew his job. Both inside and outside plant forces worked around the clock on 12-hour shifts.

In the days after the flood, Manager Johnson visited many public officials, business men, and prominent citizens to see if they had any special telephone needs. "When they had any reasonable request we certainly tried our best to fill it," he reported. "Unless it was really essential, we couldn't tell them when they were going to get service. We ourselves didn't know. But everyone was appreciative of our problems."

Monday night, a ray of optimism spread over the telephone family. Work was progressing so well on drying the dial equipment that it was thought partial service would be restored within 24 hours. At least, that's what they hoped.

Their hopes were not in vain. At 4:19 Tuesday afternoon General Plant Supervisor Edward Pilotti dialed WALnut 8-6643, a number picked at random, and got Mrs. Mary Mountford; the first local dial call in 100 hours was put through. From then on it was just a matter of cutting in equipment piece by piece. That is, almost all phones were put back in service. Several hundred couldn't be reconnected because

customers' premises were no longer there.

With dial service expanding hourly, work still proceeded on the installation of the manual office. The second floor addition was finished—complete with wash rooms—while Western Electric installers were putting the final touches on wiring the nine-position manual board. This, Southern New England engineers thought, could be taken down as a unit and stored away against another disaster. Next time, they thought it could be installed in a matter of hours. General Equipment Engineer Herbert Sundius says, "If we're going to keep on having these fights with nature, we'll be even better prepared."

Civic officials, newspapers, and the man on the street all had high praise for the speedy restoration work. Telephone employees had similar comments for Putnam folks, too: for all the individuals and organizations who went out of their way to help.

The telephone job was completed. But the job of rebuilding the city of Putnam is still being done. About 2,000 were left homeless, 3,000 thrown out of jobs, and countless others left without a penny. But Putnam residents are confident of the future. In the words of Mayor John N. Dempsey, "Don't worry about us. We'll be back."



Supplementing the preceding articles, this account of hurricane and flood damage in eastern states last August again shows the Bell System prepared to meet every test

CONNIE, DIANE, AND JUPITER PLUVIUS

JOHN H. MITCHELL

PLANT DIVISION, O. & E. DEPARTMENT, A. T. & T. CO.

SOFTENING UP, DIVERSIONARY ACTION, SURPRISE ATTACK make up a military formula for invasion. Three meteorological monsters used this formula to assault the Northeast last August. "Connie," one of two hurricanes, dealt the first blow—a softening-up job with hammering winds and pounding rain. Hurricane "Diane" moved in right behind, hit the beaches, stormed inland, then

suddenly stalled her drive. This diversionary action signaled the third phase—surprise attack. Miles away, "Jupiter Pluvius" let go with the crusher—tons and tons of demolishing water on unsuspecting targets.

Their toll was heavy: over 200 persons dead, over one and a half billion dollars' worth of property damage—and nearly half a million telephones. While thousands



Telephone poles and wires stand staunch as Hurricane Connie smites the mainland.

Flood's Toll

Statistics reveal nothing about suffering and heartbreak. They include no percentages for the shock of seeing one's life accomplishment whirled away by a destructive torrent, nor for the discouragement of having to start building afresh a structure which had once seemed to hold security secure. But some representative figures may help to convey the extent of the catastrophe which assailed northeastern United States last August.

Red Cross reports show 1,326 homes destroyed, 4,808 with major damage, and 14,578 with lesser damage.

More than 200 large factories in the flood area were closed, at least temporarily. The brass and copper manufacturing centers of New England were so badly hit that 30 per cent of the nation's total brass mill capacity was put out of production for two to three months.

The floods passed without any serious outbreak of disease. But in many places people had to boil their drinking water for

days, and contaminated food and drugs in commercial channels, with a value of some \$17,500,000, had to be destroyed.

Necessary road repairs in six states were estimated to total \$97,500,000. Federal funds of nearly a billion dollars were made available to help rebuild the flood-battered areas, and unofficial estimates were that \$100,000,000 will be required for the repair and rehabilitation of public facilities.

As of September 1, the Defense Department's Corps of Engineers was engaged in repair work in 52 towns, and expected the total to reach 99. Lieut. Gen. Samuel D. Sturgis, Chief of Engineers, estimated flood damage at above one and a half billion dollars, and he called the rehabilitation job "one of the biggest and toughest since Noah."

This summary of bold facts is from information supplied by the Federal Civil Defense Administration, which coördinated a disaster program to which all departments of the government contributed.

struggled to recover from the wreckage, telephone people worked another restoration marvel. They accomplished their task in a matter of days, just as they had done during last autumn's three hurricanes. Once again the Bell System met disaster well armed. Its normal state of preparedness assured rugged plant, swift supply, and skilled people. Last minute preparations assured that these resources were fully mobilized.

Connie

IT WAS DURING the week-end of August 7 that telephone people began hearing reports of Connie, the first hurricane of the season to threaten the mainland. Warily they watched her, for last year's experience had been bitter. They studied Weather Bureau bulletins and tracked her course for several days. She had incubated in the

West Indies, as do all tropical storms, hatched into a hurricane and, christened Connie, churned her way northward, passing well east of Puerto Rico.

Telephone people readied their reserves, alerted forces, checked supplies, activated control centers. In New York, the A. T. & T. emergency center opened to begin a day and night vigil awaiting Connie's decisive move. On Friday, August 12, it came. In mid-morning Connie with her 100 MPH winds banged into Morehead City, North Carolina, then swept over Norfolk, up the Chesapeake Bay into and through the heart of Pennsylvania. Friday she emptied herself over Northern Pennsylvania and upstate New York, backwashing New Jersey, New York City, and Long Island on her way.

Her destruction was not so great as last year's, but this was little comfort to those



Many circuits were lost when this bridge over the Delaware River between Phillipsburg, N. J., and Easton, Pa., was wrecked by the angry flood.

These cables near Norfolk, Conn., continue in service although the highway couldn't take it.



A new pole goes up beside the Quinebaug River in Putnam.



on the beaches. Cottages, piers, bridges, docks just shortly reclaimed there, were dashed to pieces, and so it was with poles and cable. Winds and their special victims, trees, snarled telephone plant into disorder in North Carolina, Virginia, and Maryland. The 6000 telephones lost by the Southern Bell Telephone and Telegraph Company do not tell the full story in North Carolina, because the area raked most fiercely by Connie is largely served by an Independent telephone company. A better measure of the whiplash winds would be the 16,000 telephones knocked out in Virginia, the 5000 in Washington, D. C., and the 35,000 in Maryland.

By far the greatest cause of service disruption was the interplay of water and wind on trees. Rain softened their footing, then wind toppled them into cables. Six to ten inches of rain deluged Pennsylvania: 44,000 telephones were out there, and 19,000 in upstate New York. But even as this was happening, the first of 71,000 telephones were being disabled in New Jersey, 37,000 in Long Island, and 8,000 surrounding New York City, where heavy rain clouds already positioned there jettisoned tons of rain as Connie's approach gave the signal.

Telephone men with trucks and supplies moved in right behind the storm to size up and get at their job. Poles, wire, cable, hardware—all that was needed to get started—was on hand waiting in store-rooms for just such emergencies. Long before these ran out, Western Electric shipped more in. By Monday night, just three days following Connie's charge inland, all restoration, if not the final clean-up, was completed and service once again normal. And all but a few of the disrupted toll circuits were again in use Sunday.

When it was all over, 241,000 telephone

stations had fallen to the violence of wind and rain in states served by the Southern Bell Telephone and Telegraph Company, The Chesapeake and Potomac Telephone Companies, The Bell Telephone Company of Pennsylvania, The New Jersey Bell Telephone Company and the New York Telephone Company. The cost of returning these telephones to service slightly exceeded two million dollars.

Diane

THOSE IN THE FIELD splicing cable, stringing wire, running strand were too busy to worry about what the weather held for tomorrow. But those in report centers weighing the damage counts and recording the rapid restoration progress kept one eye cocked toward later Weather Bureau bulletins. Diane, another hurricane first making print on Friday, was not steering the northeastward course to sea as meteorologists thought she would. Rather she chose to follow her older sister and headed landward—toward the battered Carolinas. Again telephone people prepared—and waited.

Wednesday morning, August 17, she struck—at Wilmington, North Carolina, shortly after 6:00 A.M., not far from where Connie entered just five days earlier. This was just about where Hazel had blasted her way in last October. Diane then turned northward, and by nightfall sputtered into central Virginia. The 100-MPH winds which she brought ashore quickly lost momentum. As she moved over Danville toward Lynchburg, her eye flattened and was difficult to find. Heavy rain and confused wind seemed all that was left of a once mighty and fearsome hurricane. Miraculously, damage proved light. Southern Bell counted only 3500 stations out—



Helicopters played an important role in emergency operations. Above: The rope being paid out over Brodhead Creek is the first step in bridging the gorge with emergency cable. Center: Rope is being loaded aboard 'copter. Bottom: These cables are being flown across the gorge to East Stroudsburg.



ators everywhere rallied to
point of need. Top: Cots were
p to enable traffic personnel
ay on the job during the
gency. Center: Out of town
ators are welcomed at Eas-
Pa. Bottom: These traffic
ole got to their jobs in Spring-
Mass., in an Army amphib-
ious vehicle.





Left: Emergency radio telephones were put to immediate use to provide essential service temporarily. Right: A circuit was set up in a hurry beside Brodhead Creek for Civil Defense.

though once again the hurricane centered through Independent territory.

Early the following morning at New York City, the A. T. & T. emergency center began its job of preparing the morning bulletin to keep headquarters groups informed. One member received the report from Virginia: only 6000 stations out. Another ran through the weather bulletins. The 11:00 P.M. bulletin, issued the night before by the Washington Weather Bureau, was the important one. Summarizing it in his mind, these comments stood out—*Diane centered around Lynchburg at 11:00 P.M. EST—moving generally northward 13 MPH, failing, weakening—winds average below 35 MPH—indications are it will continue to fail and weaken—moderate to heavy rains likely to spread into central Pennsylvania—the only serious danger now is from heavy rains and flooding—this will be the final bulletin on this storm.*

Morning newscasts confirmed the prediction. Diane was all but through, as a hurricane; and her worst had not been very bad. Members of the emergency crew put together the words of their bulletin, ending with a most ironical sentence—“In view of the fact that Plant damage is not of emergency proportions and no further damage

is expected, this is the last report on Diane.”

A great relief settled over the entire East Coast. For telephone people, restoration of the 9500 telephones to service would be little more than routine. Storm and report centers could close up shop; those who manned them could return to their normal jobs. After days of blustering threats, Diane's visit was brief and by comparison easily reckoned with. Little did anyone suspect she had taken a rain check.

Jupiter Pluvius

THAT EVENING, still Thursday, heavy rain poured down on several Northeastern States. A month earlier, inhabitants would have welcomed such a rain, since July had been one of the hottest, driest months in history. But the near-record rainfall of the past week was more than enough to revive lawns and crops that survived the drought. This was generally true of the entire Northeast, where prolonged drought was suddenly changed to spongy saturation. To most people, that evening, the deluge seemed little more than ill-timed.

Next morning brought first word of floods. Diane's dying winds had sucked in a sodden mass of air hanging over the Atlantic and channeled it skyward toward

upper cold strata. There the warm moisture precipitated, and fell seemingly not as rain but as rivers of water.

Companies were canvassed early. The Pennsylvania Company reported 15,000 stations out; New Jersey 8,000; Southern New England 24,000; New England 12,000; New York normal. Since 60,000 outages spread among so many companies is not of disastrous proportions, and the pitiful plight of the devastated communities was not yet suspected, the early morning reports fell far short of indicating the seriousness of conditions or the restoration difficulties.

During the day these figures climbed. More details of flooded central offices came in from Connecticut. Yet the tragic extent was still unrealized—for where the powerful waters raged, they paralyzed the means by which they could be described to others. Photographs and stories now trickling in from stricken regions soon gave the first sense of disaster. Later that night, broadcasts characterized the disaster as the worst flood in the history of the Northeast. Surely in the midst of such destruction telephone damage must exceed the 75,000 stations last reported as out. It did.

Saturday's news described horrors. Never had the eastern states been stunned by such destruction spread over so many heavily populated districts. And all so suddenly. Many localities told the same story. Record rainfall, as much as 18 inches, fell in just a few hours on ground already super-saturated with the past week's deluge. Water striking the hillsides cascaded down the surface to the little streams. These streams turned into torrents and hurtled into rivers—building powerful walls of water. The rivers leaped their banks and filled the valleys. And where the valleys were too small to scatter the stam-

peding water, walls of it funneled through, battering and sweeping everything with it.

In Pennsylvania, near Stroudsburg, Brodhead Creek rose 30 feet in a matter of minutes. Its raging current flushed out nearly all that man had built; here the greatest single tragedy of the floods obliterated every vestige of Camp Davis and 38 of its summer inhabitants. Several miles downstream, the onrushing waves carried away bridges and all communications linking Stroudsburg with East Stroudsburg.

All along the Delaware River, from Port Jervis, N. Y., to the Philadelphia suburbs, 6 to 10 inches of rain raised flood crests which engulfed the lower portions of towns—towns like Milford, Dingmans Ferry, Bushkill, Easton, Yardley, and New Hope, where the opening of the Buck's County Summer Theater was washed out. Farther west, Scranton was battered by its Roaring Brook, and Tamaqua suffered from a tributary of the Schuylkill. On the New Jersey side of the Delaware, Trenton evacuated families from the highest flood levels ever seen there. A quiet little town, Branchville, withstood the impact of a six foot wall of water when the dam of a pond gave way in the early morning hours.

Connecticut Was Hardest Hit

HEAVIEST LOSSES occurred in Connecticut. The Naugatuck valley, which guides that scenic river on its way seaward, took 16 inches of rain and was turned, in a few hours' time Friday morning, into a racing, roaring swirl of timbers, bricks, rocks, trees, rubble—and death. Waterbury, Naugatuck, Seymour, and Ansonia-Derby all suffered heavily. The center of Torrington, farther up the Naugatuck, was gutted as streets, bridges, and water-front stores disintegrated. Downtown Bristol found itself under four feet of water from the Pequ-

Hurricane and Flood Damage

	August "Carol"	1954 September "Edna"	October "Hazel"	1955 August "Connie"	"Diane"
<i>Service Interrupted</i>					
Telephones	334,000	295,000	448,000	241,000	205,000
<i>Restoration Forces Borrowed</i>					
People	1,658	1,947	None from	None from	
Vehicles	900	1,100	Other Companies	Other Companies	
<i>Estimated Restoration Costs</i>					
Expense (Millions)	\$4.5	\$4.1	\$4.2	\$2.0	\$2.0
Capital (Millions)	1.7	1.4	1.3	.2	4.0
Total	\$6.2	\$5.5	\$5.5	\$2.2	\$6.0
<i>Restoration Interval</i>					
Days	6	5	6	3	9

buck River. The 10,000 residents of Putnam, in the northeast corner of Connecticut, watched as five feet or more of water rose to fill their town, then spent a horror-filled night as exploding magnesium plants sprayed the sky with white hot pellets. Across the state, near the Massachusetts border, Winsted's Main Street became the main channel for the erupting water of the Mad River. Here streets were gouged out, pavement shattered and tossed like wafers, leaving water, gas, sewer mains and telephone conduit stripped of cover.

The rain which fell over Massachusetts Friday—13 inches over Springfield, 11 around Worcester, and 12 in the Boston area—wrought similar destruction but in decreasing severity as it moved from the hills and valleys to flatter land.

Regardless of location, wherever water rose and rammed its way toward the sea, it swept away homes, kicked aside bridges, undercut highways, and plundered the countryside. Estimates place the property damage at \$1.6 billion—the human loss more than 200 lives.

Flood Damage in Six States

INEVITABLY, TELEPHONE PLANT went too. Service to 17,000 telephones was swept

away in the upper Delaware-Stroudsburg area as dislocated poles and bridges carried cables with them. In and around Scranton, 6000 were lost when the Cedar Avenue bridge lost footing. Nearby, Roaring Brook washed out desperately needed circuits to Stroudsburg. Altogether, the Bell Telephone Company of Pennsylvania counted 34,000 stations out. New Jersey Bell's total was 19,500. This includes Phillipsburg's 10,500 telephones which were cut off from their central office in Easton when the Easton-Phillipsburg bridge buckled into the Delaware.

Flooding of basement power plants in two Connecticut central offices—Winsted and Bristol—snuffed out 25,000. Seymour's 4000 were briefly disabled when civil authorities ordered the town evacuated during a particularly threatening period. Although station outage in Torrington was not so severe, all of its cables leading to the outside lay flooded in the center of town. Water whirled five feet deep around the Putnam central office dial equipment which served 7000 telephones. Southern New England's loss was 82,500, slightly under 10 per cent of its total.

In the territory of the New England Telephone and Telegraph Company 60,000

Connie, Diane, and Jupiter Pluvius

telephones succumbed, 25,000 in the Springfield area, 8000 in Worcester and vicinity, 23,000 around Boston and 4000 in Rhode Island. Altogether, flood waters disrupted service to 196,000 telephones.

By comparison, the number of long distance circuits washed out seemed small. Some of these were long haul and readily rerouted over other facilities, but many were interconnecting links between nearby communities. Loss of these left a number of communities without communication to the outside, but within a few hours emergency lines reunited most of them.

Although telephone damage was not as great in numbers as it was during earlier full-scale hurricanes, its effect was more serious and restoration far more difficult. Trouble was concentrated, not scattered. And this time trouble plagued the central office as well as the pole line. The job of maintaining communications was tremendous. The job that Bell System men and

women did was equally tremendous. Operators, including many on vacation and former employees who volunteered their skills, rallied around their switchboards. Once there they stuck by doggedly, bucking the odds against moving many times the number of calls through a fraction of the number of circuits. But the most urgent went through. Commercial people arranged for and coördinated emergency service to hospitals, relief centers, disaster headquarters, civil agencies. They manned mobile telephones and public booths hurriedly moved in to re-establish communications with stricken communities.

The heavy construction needed to get plant back on its feet took the combined ingenuity of the Plant, Engineering and Western Electric installation forces. The immediate goal was to make it work—permanent reconstruction could wait. Emergency circuits came first. Radio, sections of undamaged cable, twist, anything that

Vigil at A. T. & T.'s emergency center in New York City.



could be improvised into carrying speech bridged the gap until more and better were made available. Three central offices made lifeless when power plants failed in flooded basements demanded instant attention. (Commercial power failed to some 70 central offices whose batteries maintained uninterrupted service until emergency generators, either permanently installed or hauled in, picked up the load.) One of the first trucks to get through to Winsted carried a new diesel-generator which was hastily set up in the back yard. In Pennsylvania, emergency generators literally flew in—by helicopter—to the Bushkill and Cresco offices before their battery reserves ran out. The restoration masterpiece which took place at Putnam, Connecticut, is described on previous pages.

On the outside every conceivable means was used to tie cables together again. Helicopters carried the first lines across Broadhead Creek and Farmington River, both still too enraged to allow any other means of crossing. In at least three places the Coast Guard, using line-throwing equipment, shot lines across the Naugatuck River. On the battered Phillipsburg-Easton bridge, Pennsylvania, New Jersey, and Long Lines construction forces feverishly spliced new wire to old in spanning the gap left by collapse of the bridge and the nine cables on it.

What they accomplished was incredible: the speed with which they did it was even more so. By Sunday noon, just two days later, there was service of some kind into all areas served by the Bell System. By

Wednesday night, six days later, service was again normal everywhere but the hard hit sections of Connecticut. At the end of the ninth day, service was back to virtually all users save those no longer there. And long before houses are repaired, highways repaved, or bridges rebuilt, telephone plant will stand once again tidy and trim.

The Test of Preparedness

FIVE TIMES within less than one year's span, Bell Companies have matched stamina against hurricane's disaster. Five times they have bounced back swiftly. Their people, skilled and with purpose, joined as one in the giant tasks of recovery—while many more in neighboring companies stood ready to add their might as they did last Fall. Materials flowed in abundantly, for the Western Electric supply pipe seemed never to run dry. Organization, line and staff, gave orderly direction. And financial strength—initial flood restoration cost six million dollars—assured that each was in ample supply.

But with Diane came a special test—one of preparedness. While hurricanes approach there is time to muster resources. The floods triggered by Diane exploded without warning and brought a different type of damage. There was no time for special preparations. Telephone plant had to rely on its ruggedness, people on their everyday skills, organization and supply on its everyday state of preparedness. Once again, the Bell System proved itself prepared, inherently, for any emergency any time.

An experiment by a group of Bell System companies at the University of Pennsylvania seeks in an Institute of Humanistic Studies an answer to this question:

HOW CAN WE BROADEN THE TELEPHONE MAN'S HORIZON?

JOHN MARKLE II

*Vice President, Personnel, THE BELL TELEPHONE
COMPANY OF PENNSYLVANIA*

HOW DOES AN APPRECIATION of Beethoven's Ninth Symphony help a telephone man to do his job better?

Why is it that another man who has a comprehension of what James Joyce is trying to say in "Ulysses" can make a greater contribution to the Bell System than if he knew nothing about this detailed study of life in a modern city?

What bearing does a course on the "Philosophy of Ethics" have on the ability to give better telephone communication to the public?

Ask these questions of any Bell System executive ten or even five years ago and he would have looked at you in amazement, and then probably have told you to leave the music to the musicians, the ethics to the philosophers, literature to the professors, but kindly keep the telephone business out of any of them and let those who know it run it. If extra study is needed, he'd say, let it be along the lines of engineering and whatever subjects directly relate to the job; but certainly such unrelated

studies have no relationship to job performance.

Now, if this were the usual type of magazine article, the next few paragraphs would tell you exactly how wrong this old-timer is in doubting that non-related subjects can help a telephone man. But since this is the story of an experiment, the end of which is not yet, nor may be for at least ten more years, there is no such cut-and-dried answer.

For the past two years, a group of Bell System companies have been operating at the University of Pennsylvania a program entitled the "Institute of Humanistic Studies for Executives." It involves the exposure of a few men from the middle management group of the companies to a 10-month program in the Humanities; and at this point, all that can be said is that we think we're headed in the right general direction.

It should be stated at the outset that the Institute was not set up to help along the cause of the Humanities or Liberal Arts,



A seminar on "World Organization" in the Institute of Humanistic Studies for Executives is conducted by Dr. Philip E. Jacob (far end of table), professor of political science at the University of Pennsylvania. Students are members of the Class of 1955.

however deserving, nor was it aimed at making dilettantes out of business men. The program was treated like any other business decision; that is, a particular approach was applied to a current problem in management development because it was felt that the money would be wisely spent and, in due time, pay off.

A comparison could be made to almost any product or service. Lawyers do not exist because a group of eager young men want to study law and it gives them something to do which will support them, but rather they exist because there is a need for their services. As another example, we all know what's good for babies—milk, orange juice, vegetables, and so on. These things they must have to grow into husky boys and girls. But pediatricians do not prescribe these foods to help the dairymen or the orange growers or the farmers, but rather because these nutrients are good for babies. We think the Humanities will help us solve a problem, and so we are using

them—but not because they are a fine thing to study in themselves.

WHAT IS THIS "PROBLEM" in management development? It is so closely integrated with our modern life that it cannot be stated in one sentence. Business in America has been growing at a prodigious rate. As it grew larger, it was broken down into functional units called departments and, with the growth of staffs, business really became complex. This meant greater and greater specialization by individuals, who tended to concentrate on the particular area of knowledge in which they had become expert.

Another facet of the problem of specialization can be seen in what has been happening in the colleges in recent years.

A little over a year ago, I met with a group of deans from the larger universities and colleges in Pennsylvania and Delaware. We were discussing the problem of developing broad-minded men for exec-

utive positions in business. Nobody disagreed with this objective. They said, in effect, "You're not telling us anything new; we hear this all the time, and it's great. But along with spring comes the typical recruiter, hot on the trail of college graduates. Do they ask us for broad-minded men? Oh no—what each one of them wants is a senior who is a chemical engineer specializing in hydrocarbons, or maybe an accounting major with experience in statistics. We simply try to supply the demand."

No wonder this typical bewilderment among educators is prevalent; and I believe that this overspecialization in the

colleges is the result of trying to meet a demand by business, rather than the idea of the educators. The world has been traveling down the road of specialization ever since the end of the first World War, and now the colleges are trying to counter-balance it by giving their students wider horizons through the Humanities or Liberal Arts.

With a background of many years of specialization both in the colleges and in business, how then do we train men for policy-making positions? They have been spending their careers in lower or middle management jobs where their responsibil-

Watching Dr. Carleton S. Coon make a reconstruction of a Neanderthal head in the University Museum are members of the Class of 1955. The student at the right holds a skull reproduction being used as a model by Dr. Coon—famed anthropologist who is a lecturer in the Institute.



ities were primarily for production or sales or the other day-to-day operations of the business. Even if they have been graduated from a good Liberal Arts course, the internal competition in the business will motivate ambitious youngsters to devote their time to reading technical books and learning the mechanics of the industry. Thus it follows that, except in rare cases, they cannot keep up with the outside world. In addition, the functionalization of most businesses has tended towards the development of specialists.

In an article in *Fortune*, John L. McCaffrey, president of the International Harvester Company, said:

".....the world of the specialist is a narrow one and it tends to produce narrow human beings. The specialist usually does not see over-all effects on the business and so tends to judge good and evil, right and wrong, by the sole standard of his own specialty."

And President Crawford H. Greenewalt of duPont wrote:

"Today, specific skill in any given field becomes less and less important as the executive advances through successive levels of responsibility."

THE SECOND PART of the problem is the change which has taken place in the world about us. Within the past twenty-five years there has been a social revolution. The emphasis has been on human things and social reform. We either have solved or know how to approach most of our technical difficulties. On the other hand, the really perplexing problems that we face today and will continue to face in the future are in the field of human relations. Since man is about the same as he has always been, and nobody can point to any appreciable change in 8,000 years, doesn't this raise the question as to whether a specialized educa-

tional background, with further specialization in business, properly fits men to provide the kind of leadership necessary to cope with the new problems of top management? With the United States taking the leadership in world affairs, won't this have a marked effect on business?

Clarence Randall, chairman of the board of Inland Steel Company and head of the President's Tariff Commission, in a recent issue of *Life*, discussing the need for business men to participate in Government, said, in part:

"I am afraid that preoccupation with self is the Achilles' heel of the free enterprise system. That regime stands as the miracle of the modern world for having brought the greatest good to the greatest number of any system of industrial organization yet conceived by man, but should it ever disappear, it will have destroyed itself through this cause. Men grasp its privileges without accepting its responsibilities. They crop the fields of our way of life without restoring the soil. Many live all their lives outside the zone of responsibility in their country."

Looking back, we see that our predecessors were concerned mainly with production, sales, finance, and technological advancement. Their problems were centered mostly within the business itself. Today, in addition to these matters, we feel the effect of the increasing influence of social, political, and economic changes which have taken place, and a business now has to consider itself in relation to the community, to the nation, and to the world—as well as its position within its industry. We read of some companies making decisions based upon a long-range view of their positions in society. This may involve financial contributions to charitable institutions, promotion of better schools in their communities, assuming leadership in helping to solve governmental or civic problems, and

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even acting as an important adviser to rulers of undeveloped countries in which they are operating. How well these tasks are performed will have an important effect upon the future of our civilization, which is to a large extent based upon business.

Looking ahead, it seems to us that our successors are in for even more difficult times, and consequently must be better prepared than we have been.

As Frederick E. Pamp, Jr., of the American Management Association, said in a recent article in the *Harvard Business Review*:

"The first question a company must now begin to ask of its candidates for executive responsibility is: 'What can you do that a computer can't?'"

Thus we see the problem as "How can we develop future higher management people?" A generation ago, business leadership called for "knowing the business." Today, and especially tomorrow, it calls, in addition, for "knowing mankind." Thus we see the significance of the question, "How can we get an executive to realize that, if he picks up the morning paper and sees that Prime Minister Nehru of India has made a speech with an anti-American bias, it may well have repercussions on his business two years from now?"

A FUNDAMENTAL OF TRAINING is that the development of an individual is his own responsibility and he must accept the responsibility for his own education. However, the company can assist the individual

Sir Jacob Epstein's sculptural group, "Social Consciousness," in Philadelphia's Fairmount Park, is viewed appraisingly by one of those attending the Institute.



in many ways, either by calling his attention to worthwhile opportunities or by making it possible, through time off the job or financial participation, to have these things available. For many years, we have had training courses of numerous kinds, both technical and non-technical. We also send people, depending upon their individual needs, to various University courses for business men and to courses or conferences conducted by other groups outside the business. But none of these quite answers the problem.

What was wanted was some kind of program that would sharpen the individual's creative insight, widen his frame of reference to many fields of human behavior, and provide him with some techniques with which he could test the logic and consistency of his own thinking.

When a business gets a technical problem, it frequently turns to the universities—but it almost never seeks academic aid in solving problems of human affairs. In spite of this, in 1952, at the suggestion of Bartlett T. Miller, vice president of the American Telephone and Telegraph Company, the officers of The Bell Telephone Company of Pennsylvania asked the University of Pennsylvania what it could offer to meet this need. They also consulted with others having long experience in business and education who had developed broad viewpoints in their respective fields.

Harold E. Stassen, then president of the University of Pennsylvania (now special assistant to President Eisenhower for Disarmament), went to work on the job; and his successor, Dr. Gaylord P. Harnwell, has continued a keen interest in the project. After much struggling and many conferences, a proposed curriculum for a new educational program was developed. In the face of some valued advice to the con-

trary, it was decided not to include any *applied* business studies in the curriculum, since there are already excellent courses available at many universities. If this was to be a new program, it would be one that could not be had elsewhere. And if the aim was to broaden a man's vision, then we should give him a rest from specialization.

This led us to a program in the Humanities and Social Sciences.

EVENTUALLY the Committee in charge of the Institute crystallized the various objectives which were desired:

1. To enable a potential future executive to understand and interpret the social, political and economic changes—both national and world-wide—which will influence the problems of corporate management to an increasingly greater degree in the future. This might be defined as developing a breadth of outlook, looking towards future "statesmanship" in the business.

2. To indicate the importance, impact, and use of History, Science, Philosophy, and the Arts in the world today, particularly as they influence large groups of people, such as employees, customers, and stockholders.

3. To motivate the participants in the program to accept the concept of intellectual activity as a never-ending process to be continued throughout life.

4. To balance with a humanistic background the almost complete attention generally given by younger men in the business to acquiring technical knowledge and competence as a result of working in an atmosphere of intense competition with other individuals.

5. To offset a tendency to overconformity, which is bound to occur in a business which is highly specialized and which promotes almost entirely from within the organization.

Early in the planning, the project was discussed with other Associated Compa-

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nies of the Bell System, and several of them were enthusiastic about trying it experimentally. Classes began in September 1953, and the first class of 17 men from seven of the Bell companies was "graduated" in June 1954. A second class of 19, with three additional Bell companies participating, finished in 1955. The third year is about to start, with four more of the companies sending students.

The Companies represented in 1955-56 are: The Pacific and the Mountain States Telephone & Telegraph Companies, the New York and Wisconsin Telephone Companies, the Southwestern, Northwestern, Illinois, Michigan, Chesapeake & Potomac, and New Jersey Bell Telephone Companies, The Bell Telephone Company of Pennsylvania, the Western Electric Company, and the American Telephone and Telegraph Company.

Teaching methods include lectures, discussions, seminars, and field trips. Text-

book readings are assigned in advance of a lecture or discussion. The books are given to the student when he leaves, and he thus has the start of a substantial library—to which, it is hoped, he will keep adding. The Institute has its own small reference library, and the students are encouraged to draw upon the University Library and other libraries in Philadelphia.

In addition to the regular work, some of the richest experiences are found outside the classroom. There are visits to the United Nations Secretariat; Philadelphia Orchestra concerts; New York, Washington and Philadelphia museums; and the many other lectures, exhibitions, and theaters which are to be found in a great metropolitan center of culture such as Philadelphia.

The over-all guidance of the Institute is the responsibility of a committee headed by the Provost of the University. On the committee, in addition to the Provost, are

Dr. W. Rex Crawford, director of the Institute of Humanistic Studies for Executives, leaving Blanchard Hall, the Institute's "home" on the University of Pennsylvania campus in Philadelphia.



two telephone representatives and four deans or professors of the University. One of the latter serves as the Director of the Institute.

The teaching staff at the Institute is drawn primarily from the faculty of the University of Pennsylvania, with important help from nearby Swarthmore and Bryn Mawr Colleges. In addition to the Institute faculty about a hundred guest lecturers from many other colleges and universities, as well as the University of Pennsylvania, are brought in to stimulate new ideas. These men are all outstanding in their particular fields and often stay on for further informal discussions with the students.

Since the primary function of the instruction is to help the mature individual to organize unfamiliar data and experiences in a meaningful and useful manner, the various course instructors and guest lecturers are urged not to present a comprehensive survey of various academic disciplines. Their task is to stimulate the student's interest in new material and new ways of thinking. As Alfred North Whitehead, the famous mathematician and philosopher, in discussing the goal of a Liberal Arts education, so aptly expressed it:

"Scraps of information have nothing to do with it. A merely well-informed man is the most useless bore on God's earth." Throughout the course, the students are encouraged to reach their own conclusions about many new areas of knowledge.

The curriculum this year will cover 13 different courses of varying lengths, ranging from a minimum of four weeks to a maximum of 23 weeks. The over-all time is approximately ten months, from September to June, with breaks at Christmas and Easter. The subjects are grouped into four major fields: History, Science, Philosophy, and the Arts.

The students start with a tool course in *Practical Logic* and a study of *Economic History and Thought*. Other courses cover the *History and Aesthetics of Music*; *World Art*; a short course in *Analytical Reading* which is followed by *Comparative Literature*; and a course in *Social Science*, covering the various aspects of human behavior.

Later in the year, as some of the earlier courses terminate, come the *Philosophy of Ethics* and the *History and Meaning of Science*.

It might be noted that most of these courses cover certain individual subjects or groups of subjects. They are pretty well finished by the spring recess, and then the various areas of knowledge and ideas are brought together and related to our present-day world in the courses presented during the final weeks, which are: A detailed study of *Ulysses*, James Joyce's book about life in a modern city; a course in *Modern Architecture and City Planning*; a course in *American Civilization*; and finally one in *Political Science and International Relations*.

THE FIRST QUESTION usually is "What are the results?"

No figures are practicable. In an experiment as new as this, a great deal was learned the first year, and the second year benefited by the changes made after the initial experience. Further improvements will be made in 1955-56.

An attempt was made to evaluate parts of the program by means of certain psychological tests. In addition to testing the first and second years' groups at the beginning and again at the end of the program, they were also compared with a control group of men not taking the program but of similar ages and at the same levels of responsibility. This gave valuable information

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about the curriculum and pointed the way toward some of the modifications which were made in the subsequent years. It also gave some indication that the program was headed in the right general direction. However, any testing of this kind can cover only certain restricted areas and will not give a complete answer, either as of now or, more important, as to the future.

An often-asked question is "Why should the company spend money in this way? Won't an ambitious young man think of these things and get the same information on his own?" Reflection will indicate, I am sure, that this approach is not practical. Granted that a few exceptional individuals with perhaps a Liberal Arts education might have the time, stamina, and ability

to do the necessary reading and take an interest in the cultural life of the community, still, this will not meet the objectives. We are not looking for areas of learning, nor turning business men into connoisseurs of the arts. Rather, we are giving them a chance to find themselves and their places in society by a sabbatical leave, to try out their own ideas through reading and discussion with others, and to study under a guided program designed for their needs—of which they may not even be aware. Clearly, it would be impossible for an individual to do this on his own.

We believe that a man must have lived in the world and have become more mature before he can absorb and appreciate the value of the Humanities and be able to

Statue on the University of Pennsylvania campus of Benjamin Franklin arriving in Philadelphia in 1723 at the age of 17. The University claims him as its founder.



apply them. This is really an experiment in adult education. A few results, however, are known:

a. There was tremendous enthusiasm on the part of both years' participants. They tell us they have increased personal identity and self-realization. Boiled down, this means that the man knows where he is going and why he has chosen the path he has.

b. The changes in the men were apparent to those watching them. They have greater intellectual curiosity and self-confidence, and are better able to express their ideas.

c. They tell us it has made them better family men, better citizens in their communities, and better individuals.

If this is true, won't they be better telephone men?

To quote from a small part of a report made to his company by one of the first year's students:

It has caused me to re-evaluate my place in society. It has increased my interest in civic betterment and the social welfare. It has prompted a new and deeper appreciation of the privilege of being a citizen of the United States. It has produced a new love for books."

d. There were two interesting by-products which were not planned:

Members of the faculty were emphatic that they had also been educated. It was a new experience to most of them to teach active adult minds, and many of them re-evaluated their conception of business men.

The guest lecturers, prominent in many universities, were impressed by the high quality of the students and the fact that a corporation would try such an experiment.

In conclusion, let me draw one more comparison. The poet John Donne wrote in 1624, in one of his meditations, that "No man is an Iland, intire of itself; every man is a peece of the Continent, a part of the

Maine." The concept of wholeness, as applied to physical, intellectual, and spiritual health and well-being, has gradually become accepted by enlightened people. During the early days of World War II, many of us still felt safe from enemy bombs, due to our protecting oceans. We knew that, while an air-raid on our country was possible, it was improbable. The dramatic ending of that war with the atom bomb, and the later development of the hydrogen bomb, have forever destroyed any sense of immunity from enemy action.

"All are but parts of one stupendous whole, whose body nature is, and God the soul."

(ALEXANDER POPE—*Essay on Man*)

TODAY'S WORLD stands in desperate need of men with wide horizons and breadth of vision. Certainly the need for whole men as executives—men who are more than technical experts—is universally felt. By the development of such men, the public which we serve will benefit in the years to come.

Most Americans believe that our country achieved its greatness because we developed a business civilization which produced the highest standard of living ever attained. The future of this civilization depends, therefore, upon the re-establishment and continuance of a high level of leadership. This being the case, don't we have to train the next generation to be able to cope with the social as well as the usual business problems? Don't we have to motivate them to assume such responsibilities?

This is an experiment in that direction. It may or may not be the final answer—but certainly it seems to be a good beginning.

DREAMS WITH A PURPOSE

HENRY T. KILLINGSWORTH

Vice President IN CHARGE OF THE LONG LINES DEPARTMENT, A. T. & T. CO.

"AMERICANS of the period between the 1850's and the 1950's were among civilization's most practical dreamers. And they took their own miracles for granted."

This could be the thesis of a chapter in a yet-to-be-written history of America. The historian might develop his topic by using the telephone business as an example. For here is an enterprise which, through imagination practically applied, has fostered growth and prosperity in our country.

Americans have been "practical dreamers"? Is this a contradiction in terms? A good case for using the words together is found in telephone history. Over and over again, through the years, people associated with this business have had dreams with a purpose and have seen their dreams come true.

When his invention only carried words which were mostly unintelligible over distances which were measurable in feet, Alexander Graham Bell had the vision of some day "talking by telegraph" from one end of the country to the other.

But this was not enough. In 1885, just a few years later, the founders of American Telephone and Telegraph Company* in their certificate of incorporation declared that its lines would connect every place in the United States, Canada, and Mexico

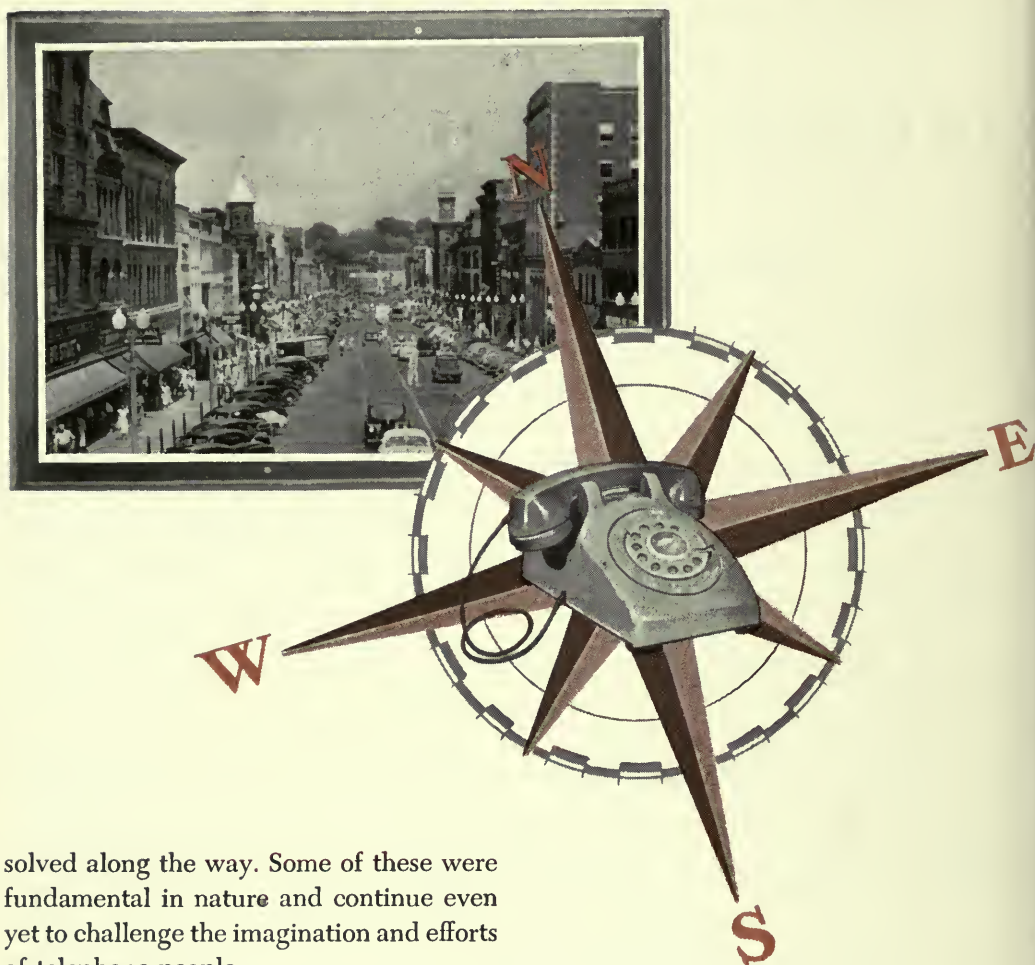
with every other place in those countries—and added in prophetic manner "and also by cable and other appropriate means with the rest of the known world as may hereinafter become necessary or desirable. . . ."

Here was a telephone passport to all places on the earth though the telephone itself was yet but in its infancy.

Fifty years later—just a moment in the course of history—a telephone conversation had girdled the earth and regular service between the United States and countries lying beyond the seas had become commonplace. Connections with most of "the rest of the known world" followed swiftly. And a dream with a purpose was converted into a fact accomplished.

BETWEEN THE DREAM and its fulfillment there were many people—individuals and groups—whose efforts were necessary to transform the vision into reality. Ideas were translated into achievements through the persistent and skillful application of human knowledge. Many riddles had to be

* Before its merger with the American Bell Telephone Company in 1900, the American Telephone and Telegraph Company was sometimes referred to as the Long Distance Company. After the merger, the functions theretofore handled by the A. T. & T. Co. were assigned to the "Long Distance Lines Department" of A. T. & T., now known as the Long Lines Department.



solved along the way. Some of these were fundamental in nature and continue even yet to challenge the imagination and efforts of telephone people.

One such basic problem was the provision of connections between every telephone and every other telephone. Until it was met, at least in rudimentary fashion, growth of the service was held in check. To connect as few as ten telephones with each other by direct lines called for forty-five lines. Twenty telephones required 190 lines. Some method of central switching had to be found. Switchboards were the answer.

Improvements in the technique of switching continue to be made and the end is not yet. Soon it will be possible for every telephone user to make his own connection with any other telephone.

Riddles in the field of transmission also have been encountered and solved. Here, perhaps more than in other fields, advancement of telephony has depended upon dreams with a purpose. Less than eighty years ago the conquest of distance by the human voice seemed to be in the realm of fantasy. But men of tremendous faith and technical skill set about extending the capacity and range of telephone circuits so that they would carry more and more voice signals with ever greater clarity over ever greater distances.

As transmission improvements came, telephone service moved out across the

land. By 1915, a telephone line had made its way across the continent. Less than a year later, telephone engineers succeeded in transmitting speech across the Atlantic by radio. In another decade, radiotelephone service was inaugurated between New York and London. This was a major milestone in the progress toward the world-wide communication by voice envisioned by the founders of the business.

As if to etch in the corners of the dream, telephone cables are now being laid across the North Atlantic; others will soon reach Alaska; and still others to Hawaii are on the planning boards.

THE PREDICTION OF THE FOUNDERS was amazingly correct, but it is too much to think that even those far-visioned persons could have known of the variety of business and social communication services that were to follow, or of the technical miracles which have brought all this about. Surely they would be puzzled upon hearing such terms as carrier current, coaxial cable, radio relay, automatic message accounting, crossbar tandems, television networks; or references to such queer sounding devices as "Nike."

Yes, that first generation of telephone people almost certainly would be impressed by the marvels that have come to pass. No doubt they would be moved more by today's wonders than are we. It is characteristic of Americans to accept as common-place the most fantastic scientific developments. Through sheer familiarity with the miracles of communication, we take them for granted. The demands of the every-day job prevent us from taking a panoramic view of our achievements as they influence the life of the nation.

It would be good for each of us to pause for inspiration once in a while. We need but look about us, note the endless ways in which business and social activities depend upon telecommunications, then try to picture America without these services.

Telephone men and women may take for granted the wonders of modern communications, but one thing they do not dismiss lightly. It is of long tradition and a familiar concept to all: the obligation to continue searching for better ways to serve each customer—actual or potential—as and when he wishes to be served. Perhaps that may be the greatest dream with the greatest purpose of all.

Nearly 3,000 "Business Exchange" salesmen are solving communications problems for customers throughout the Bell System—to the mutual benefit of both

SELLING BETTER SERVICE TO BUSINESS CUSTOMERS

WILLIAM W. PENICK

Business Exchange Sales Engineer, O. & E. DEPARTMENT, A. T. & T. CO.

FOR A large mid-west industrial manufacturer, taking inventory meant a long, expensive chore; a tedious process of recording thousands of individual items on specially prepared inventory cards. It required several experienced two-man teams, which meant pulling salesmen in off the road to assist. And errors were inevitable—errors in recording and in transcribing information to permanent records.

A telephone company salesman called on this manufacturer recently and sold a communications service which simplified the whole problem.

An expensive, complicated equipment arrangement? Not at all!

Telephone jacks were installed at a number of points in the warehouse and connected to a few simple private lines to the office. Head sets equipped with long spring cords enabled the checkers to "plug in" nearest their point of operation and relay the stock information directly to the office, where it could be noted and checked against permanent records.

The results? Elimination of two-man checking teams—substantial reduction in errors—inventory time halved.

To quote the customer, "Accuracy is achieved with far less trouble than under the previous plan. The telephone arrangement has saved us at least \$2,500 for the first inventory, and other benefits have accrued to the operation of the business."

Big deal? For the customer—yes. For the telephone company, this was just one of the relatively simple services being provided daily for some four and one-half million business customers of the Bell System by a special force of some 2,400 "BX" (for business exchange) salesmen.

It's the BX salesman's job to call on these business customers, to analyze their needs, to determine the appropriate communications required, and to get them to buy. Trained in solving business problems in terms of better communications, these salesmen are calling on business customers across the country: some whose needs may be served by a single telephone, others

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whose operations may require a large dial private branch exchange with as many as 10,000 telephones and 40 switchboard positions.

In many instances, the problems encountered are simple and easily taken care of. A BX salesman calling on a small air line office in South Bend, Indiana, recently found that during plane arrivals the attendant was too busy to answer the second line and was simply leaving the receiver off the hook. The salesman pointed out that an automatic answering and recording set on the second line could explain to calling customers that the attendant was temporarily busy and ask them to leave their number so he could call them back. He wrapped up the sale by pointing out that calls could also be automatically answered at night when the office was unattended.

But not all answering problems are solved quite so easily.

Some Problems Require More Study

TAKE THE CASE of the great metropolitan newspaper that did a large classified advertising business. The central office lines serving its classified department were seriously overloaded by the large volume

of incoming calls, yet there wasn't enough space on the order takers' desks for the additional equipment needed. Customers were complaining of busy conditions and slow answers, and business was being diverted to a competing newspaper.

A BX salesman solved the problem and sold the solution. A modern automatic call-distributing system was installed which is capable of handling as many as 200 central office lines and of serving 198 order-taker positions. The only external evidence of this large new system was a single small key box and telephone installed on each order-taker's desk. But callers no longer encounter busy conditions.

When all order-takers are busy, incoming calls are "stored" by the equipment in a mechanical "corral." When order-takers become available to receive new calls, the corral gate opens and the "stored" calls are automatically distributed to the first available order-taker substantially in the order in which they were received. Now each order-taker automatically receives about the same number of calls, and the equipment automatically sees that the earlier calls are answered first.

Telephone service contributes in many ways to the nation's defense. That's a light tank being assembled in the background.





These order turrets make possible the smooth handling of a newspaper's classified advertising.

A good job of solving a communications problem with an interesting equipment arrangement? Yes—and telephone company BX salesmen throughout the System are solving many such problems just as tough and tougher every day, with equally interesting arrangements.

But the big story today is that BX salesmen are actively seeking these customers out, making a special effort to discover their problems, and aggressively selling them Bell System services. As the telephone companies gradually catch up with the post-war demand, as equipment gradually becomes more plentiful, additional BX salesmen are being added to the job and more and more company-initiated or "scheduled" visits are being made with business customers.

True, not every equipment item needed is on the shelves all the time, but the sales people know most of these shortages are temporary. They know that the production of most of these items has been substan-

tially stepped up this year to meet expanding requirements. They know that the day is approaching when they will be able to offer any customer anything he needs or wants whenever he wants it, and they're gearing up to do the job. In the meanwhile, they are concentrating their sales effort on the facilities which are in good supply.

The Community Approach

ACTUALLY, the initiative in this BX job was seized by some of the companies last year. A number of active sales projects were undertaken in several areas, with interesting results.

Take the case of Longview, Washington, which has been recently converted to dial. In the first 21 days of a sales campaign, five BX salesmen sold some 300 individual items of telephone service to 191 business customers—including trunks, answering sets, central office lines, extension telephones, a switchboard, and other miscellaneous equipment.



Another type of order turret does as much in a busy air line reservation bureau.

Estherville, Iowa, is a small agricultural community of 7,000 population with 3,500 telephones. Before Estherville was converted to dial, a small task force of two BX salesmen and a telephone saleswoman was sent in to make a sales and servicing canvass of selected business and residence customers. The local manager introduced the "visitors" to community leaders, including the mayor, chief of police, newspaper editor, chamber of commerce secretary, and others. The local newspaper ran a front page story complete with pictures describing the canvass, explaining that its purpose was to make certain that both business and residence customers had the type of telephone service best suited to their individual needs. And individual needs were not hard to find. About one out of every three customers reached was sold additional telephone services—a good batting average in any sales league.

In Boulder, Colorado, recently, five salesmen sold over 1000 items of telephone service to one out of every four business customers reached in the first 35 days of a special sales canvass.

These community-wide sales activities are getting under way in many other parts of the country, and business exchange sales people are devising new ways to seek out needs and develop wants.

*Some Sales Activities Are Aimed at
Certain Classes of Customers*

IN MICHIGAN AND VERMONT, for example, first-class motels were singled out for special sales promotional effort with good success. At this writing, over half of the 100 motels in the selected market have been sold small P.B.X. systems with a telephone in every room. And a good many of the telephones are colored sets. One Vermont motel owner had been operating with a single eight-party rural telephone and apparently with little thought of needing more. He now proudly advertises a telephone in each of his 22 rooms.

Getting in touch with thousands of small business customers quickly, effectively, and profitably is no small job, but it's rapidly becoming an accomplished fact in Connecticut. Supplementing the regular "premisses" visits made by BX salesmen, a special

force of some 18 BX saleswomen in 10 exchanges are calling one-line business customers by telephone. Services sold as the result of these telephone "visits" run literally into the thousands. Sales are being made to one out of every four customers reached.

Another special activity in the small business customer market is one recently initiated in Chicago and designed primarily to increase local message usage. A letter signed by the BX salesman and explaining the purpose of his visit is mailed to the customer a few days in advance. Then, using a specially prepared brochure, the salesman calls on the customer to explain how increased local message service may be used to improve various operations of his business. He shows him how regular telephone calls to his customers can be used to supplement his salesmen's personal visits, how the practice of calling his customers to thank them for orders received can be used to turn small orders into large ones, how personal telephone calls to delinquent accounts can improve his collection experience and regain lost business.

Training material is furnished the customer to assist him in establishing a definite program for these and other specific telephone usages. The BX salesman also makes a careful review of the customer's telephone arrangement, to be sure it is modern and complete. Though this particular activity is relatively new, results thus far are very encouraging.

*Good Servicing is Fundamental
to Good Salesmanship*

THE SUCCESS of a sales program depends upon the cumulative success of many individual sales and servicing negotiations, and these often depend upon the ingenuity and resourcefulness of the salesman himself. BX salesmen are fundamentally good servicing people who have a good working knowledge of the communications requirements of various business operations. But they must also be alert to sales opportunities and possess the initiative to capitalize on them.

The communications required between scattered State offices in a large northwestern State capital were until recently seri-



This private branch exchange switchboard, in a department store, is one of the country's largest serving a private concern.



Year-'round low temperature does not affect the service provided by this telephone.

ously overloading the several small manual switchboards located throughout the city. The operation was inefficient and uneconomical. Attendants were required at each switchboard after regular hours and on week-ends. After a thorough analysis, a BX salesman arranged for the installation of a large integrated P.B.X. switching system to care for the combined requirements of all State agencies in the city and the removal of seven manual P.B.X. switchboard positions. At the request of the state, BX sales people also tackled State office requirements in three outlying communities and replaced privately owned intercommunicating systems in each instance with modern integrated dial systems. Net savings to the state—\$13,000 in operating expenses. Increase in Bell revenues—\$13,500 annually. And the service—"100% improved."

ONE OF THE FIRST THINGS a BX salesman is taught is to tailor his recommendation to fit the customer's operation—and not to expect the customer to change his way of doing business to fit the recommendation. But a salesman must use good judgment—and in doing so a BX salesman in Minneapolis recently asked a life insurance company to move to another location.

With a new building under construction and a dial P.B.X. system on order, the insurance company had leased temporary quarters and a manual P.B.X. But the business expanded so rapidly that it outgrew both the temporary space and telephone service, with the new building still more than a year from completion. It appeared from the review that a temporary dial P.B.X. was the only solution:— a large job on rather short notice and an expensive installation for so short a time.



Operators of modern motels find that telephone service is an inducement to the traveling public.

The BX salesman handling the case, learning of another large customer who had moved, leaving behind a dial P.B.X., informed the insurance company of the larger space available and let them know it was equipped with telephone service that would meet their needs. In this case, the customer did change his business operation to fit the recommendation. He leased the available space and the dial P.B.X. pending completion of his new building.

All over the country, BX sales people are finding business men seeking faster, cheaper, better ways of doing everything.

They're finding them not only willing but anxious to listen to the telephone salesman who can help them save time and expense and improve their operation.

A large steel concern in Baltimore—as an example—does a substantial portion of its business by telephone, employing nine telephone salesmen to handle the large volume of telephone orders. Recently the manager appealed to the telephone company for help. Telephone orders were coming in faster than the salesmen could handle them. Customers were complaining of busy conditions and long delays, and business was being lost to competitors. The man-

Selling Better Service

ager was seeking some way to speed up the handling of the calls without adding to his sales force.

The telephone company representative found that the salesmen were spending a substantial amount of time on each telephone call in checking stock inventories of individual items. On his recommendation, an "inventory order position" was set up where current and complete stock inventory information is maintained. A two-way loudspeaker installed at this position is connected to an intercommunicating line to each salesman's desk. The salesmen, who wear operators' head sets, merely operate a key to hold the incoming call, select the intercommunicating line to secure immediate inventory information from the order booth, and then complete their discussion with the customer—all in a fraction of the time formerly required. As the manager expressed it, this arrangement provides the "split second timing" essential to his business.

A Responsibility of First Importance

IT'S BEEN a full time job for sales and servicing people in recent years to meet the ever changing communications needs of American business, and they've been operating pretty much on a demand basis. Actually, about 85 per cent of all sales and servicing contacts in 1954 were customer requests,

in spite of substantial additions to the sales force. Last year 2400 BX salesmen negotiated some eighty-four million dollars in additional annual revenues for the Bell System. And still the demand grows apace. To meet this continued demand, and in an effort to get ahead of the need and seize the initiative, the Associated Companies plan to have some 500 additional BX salesmen on the job by this year's end. At the present going rate, BX sales for 1955 should produce better than one hundred twenty million dollars in added annual revenues—an impressive contribution not only to Bell System revenues but to the efficiency and economy of the business customers who entrust their communications to the Bell salesman.

So, you see, the hero of our story has quite an important job. These business customers he takes care of, though they represent only fifteen per cent of total Bell System accounts, contribute more to Bell System revenues than do all other customers combined. They are important and responsible members of the community. Their needs are usually immediate and often special in nature. His job is to satisfy their requirements completely, to retain their friendship and good will, and to see that their confidence in Bell telephone services continues to be well founded.



A report on the 10-year accomplishments of the Frank B. Jewett Fellowships and a statement of the objectives of the new Bell Telephone Laboratories Fellowships

AIDING ACADEMIC PROGRAMS IN FIELDS OF SCIENCE

MERVIN J. KELLY

President, BELL TELEPHONE LABORATORIES

THE ANNOUNCEMENT LAST SPRING of the establishment of the Bell Telephone Laboratories Fellowships, which follow upon the now completed program of the Frank B. Jewett Fellowships, gives occasion both to evaluate the contributions of the latter and to discuss the somewhat different objectives of the new grants.

In 1944, when Dr. Frank B. Jewett retired as Vice President of the American Telephone and Telegraph Company and Chairman of the Board of the Bell Telephone Laboratories, the A. T. & T. Co. established a trust fund sufficient to finance five fellowships in each of the ten years from 1945 to 1954, inclusive. They were to be known as the Frank B. Jewett Fellowships.

The applicants for the fellowships must have completed to the doctoral level an academic program in the fundamental physical sciences, including physics, mathematics, and chemistry. Each fellowship carried an honorarium of \$3000 in the years 1945-1952. This was increased to \$4000 in 1953 in recognition of the rise in the level of living costs since the fellow-

ships were established. Each Fellow was free to choose any academic institution within the United States at which to conduct his studies and research. He was expected to make his own arrangements. An honorarium of \$1500 was paid to the institution selected, to aid in defraying the expense of the facilities it supplied. Five members of the staff of the Bell Telephone Laboratories have served as trustees and for the award of the fellowships.

The fellowships were intended to stimulate and to assist research in these fundamental physical sciences. They were indeed a fitting tribute to Dr. Jewett. He was trained to the doctoral level in physics and mathematics in the University of Chicago, and, after a few years as professor at Massachusetts Institute of Technology, was employed by the A. T. & T. Co., where he spent the remainder of his active professional career in research and basic technology and their administration.

In our country, in the early years of this century, few men with advanced degrees in pure science turned to industry for a



FRANK BALDWIN JEWETT
1879-1949

career. Dr. Jewett was one of the first. He was a pioneering proponent of the application to industry of the research methods of science. Beyond his great contribution to the organization of research programs and their administration in the Bell System, he contributed largely to the growth and to the stature of research in industry and to its receiving adequate emphasis in the nation's military preparedness.

In recognition of this leadership, he was made president of the National Academy of Sciences, and served from 1939 to 1947. He is the only scientist from industry to receive this honor, and is one of the very few presidents of the Academy to be twice elected to a four-year term.

COMMUNICATIONS TECHNOLOGY is based on the knowledge obtained from research in physics, mathematics, and chemistry. Its progress is determined by the rate at which new scientific knowledge is obtained from research in these physical sciences. These fellowships, in addition to serving as an appropriate tribute to Dr. Jewett's career, were to make contribution to the reservoir of new knowledge about matter and radiation. These are fields essential to communications technology. And technology is the keystone of the Bell System's progress in providing communication service to the nation which is better, more economic and broadened in scope.

When the fellowships were established, relatively few such aids were available

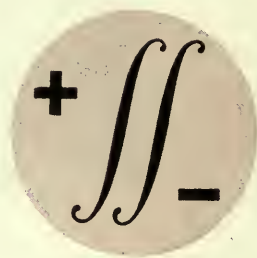
which provided adequate funds to those who had completed their doctorates—adequate, that is, for all the living costs of the candidate, even were he married. The funds paid to the Jewett Fellow made it possible for him to devote his entire time to research and study.

The honorarium of \$1500 paid to the institution was also a new feature in the fellowship pattern. It was a recognition of the cost to the institution of the services it rendered the research student. Increasingly, new fellowships, as they are established, are providing similar grants to the institution. These institutional awards are becoming quite general, even among pre-doctoral fellowships, and there is a growing trend in providing some funds to the institution for undergraduate scholarships and fellowships as well.

There have been 380 applicants for the Jewett Fellowships. Fifty-one have been awarded to 41 individuals, ten of these having received awards for a second year. The Fellowship Committee has had a most difficult task in selection, for all applicants had ability and promise. The doctor's degrees of the 41 successful applicants were obtained at 20 different academic institutions. With two exceptions, all candidates chose an institution for their fellowship work different from the one where they obtained their doctor's degrees. This is desirable, for the contact with the different viewpoints and personalities of another

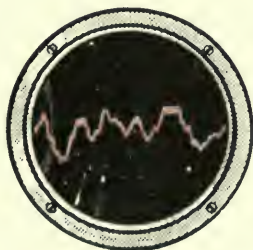
group can be an important element in the maturing of these young scientists, broadening their perspective and stimulating their creative interests.

The geographic distribution (permanent residence) of the applicants provides a striking evidence of the scope of the interest of the youth of the nation in basic science. Applications were received from 35 of the 48 states. At the time that Dr. Jewett received his graduate training, he was one of the relatively few students interested in pursuing studies in the physical sciences to the doctoral level. There were only a few of our universities where training for a doctorate in the physical sciences was provided, and more than half of those inter-



ested in such training took their graduate work at a European university.

The doctoral training of our applicants was received at some 40 of the nation's academic institutions. Thus, during the professional lifetime of Dr. Jewett, academic institutions where graduate training to the doctoral level in physical sciences was provided increased from some five or six to a least 40. The interest of our youth in a career in basic science has attained so high a level that more than 300, through their application for a Jewett Fellowship, gave evidence of a desire for training and self-improvement even beyond that afforded by the doctoral curriculum.



The decorative symbols on these pages are from covers of Bell Laboratories Monographs on scientific subjects.



Under the terms for award, Jewett Fellowships were available to citizens of foreign countries. It was required only that an academic institution within the United States be chosen by the Fellow as the place for his research and studies. Among the applicants, there were 54 whose permanent residences were in foreign countries. The permanent residences of these applicants were distributed among 14 foreign countries. This is a manifestation of the growing strength and increasingly important place of our country in world science. Five of the Fellows chosen were from this group.

Fourteen different academic institutions were chosen by the successful applicants as places where their studies and research would be done. The largest number chose the Institute for Advanced Study in Princeton. This is a privately endowed center with a most distinguished faculty, where only students with a level of training and maturity of the doctoral level or beyond are admitted. Because of the distinction of its faculty, its relatively small size, and its requirement of maturity in the student's chosen field, it provides an exceptionally stimulating environment for the post-doctoral student.

The careers chosen by the Jewett Fellows upon completion of their period of post-doctoral study are of interest. The last group selected are only now completing their work, so that there is no knowledge of their plans. All of those who

have completed the fellowships chose an academic career and accepted places on the faculty in the graduate schools of our country. They are distributed among 20 of our universities, their number at an institution varying from one to four.

With two exceptions, all of them are still in academic life. One of them has transferred from an academic institution to an industrial laboratory, and, unfortunately, another is permanently disabled. Bell Telephone Laboratories did not offer employment to any of the Jewett Fellows. Of course, had there been applications for employment from their number, the Laboratories would have had great interest. In their selection of Fellows, the Fellowship Committee gave weight to the evidence of interest of the applicant in pursuing a career in pure science.

NEW BASIC KNOWLEDGE in the physical sciences has been acquired through the researches carried out by the Fellows. Their professional competence has been increased by this period of study and research completely free from other activities. The added maturity gained through these fellowships has been an aid in their placement in academic positions in the leading graduate schools of the country. In these positions, through the years, they will make large contribution to the training of young scientists, and through continuing researches they will add further to



the ever-expanding store of man's knowledge.

The Jewett Fellowship plan presented new features that have been generally adopted and will have continuing values in the training of young scientists and in furthering scientific research. These fellowships pioneered the generous support at the post-doctoral level of young scientists destined for an academic career. Since their establishment, there has been a large increase in financial support for post-doctoral training and research. The honorarium of \$1500 for the institution was the first recognition of an obligation to aid an institution in its support of the work of the Fellow. This practice is now almost universal.

The Frank B. Jewett Fellowships, in their contributions, have indeed proved themselves the appropriate tribute to Dr. Jewett's career that was planned in their establishment.

AS THE TIME DREW NEAR for the termination of the Jewett Fellowships, the Laboratories, at the request of the A. T. & T. Co., gave consideration to "What Next?" in the Bell System's formal support of academic programs in science and technology. At the time of the inception of the Jewett Fellowships, there was great need for additional support for young scientists at the post-doctoral level. As we come to the close of the period of the fellowships, the situation has materially changed. Funds are avail-



able from many sources for the support of young post-doctoral scientists. It seemed more appropriate, therefore, to give support in an area where it is clearly needed.

The increasing depth and complexity of communications and electronics technology are requiring a more basic training for the electrical engineers in the development laboratories of communications and electronics than ever before. This situation began to appear in the early post-war years. Training to the doctoral level in engineering and the underlying sciences is becoming essential for an ever larger portion of the development engineers of a communications and electronics laboratory. Our schools of engineering and technology are not supplying enough men trained to the doctoral level to meet the requirements. As an aid in meeting this deficiency, the Laboratories established in 1948 a program of communications development training for its young engineers. All of its recruits from the engineering and technical schools are given this training, which takes almost half their time for their first three years at the Laboratories. While this training program is of great value, it is only a partial solution. In the interest of the nation's strength in communications and electronics technology, there must be more men trained to the doctoral level in the technology and its underlying sciences. It was decided, therefore, that this was an area of deficiency to which the Bell System should make a contribution.

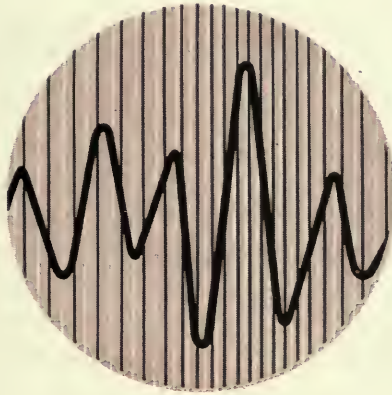


Aiding Academic Programs

Fellowships were planned through which funds will be provided for students doing graduate study in communications and electronics and their underlying sciences: mathematics, physics, and chemistry. These will be known as the "Bell Telephone Laboratories Fellowships." Each fellowship carries a grant of \$2000 to the Fellow and an additional \$2000 to cover tuition fees and other costs to the institution at which the Fellow chooses to study. (The smaller amount of the Bell Telephone Laboratories Fellowship grant in comparison with that of the Jewett Fellowship is in keeping with the lower age and training level of the candidates for these pre-doctoral fellowships.) A Fellowship Committee at the Laboratories will administer this

program in much the same manner as did the Jewett Fellowship Committee. It is to be expected that the Fellows of this program will mainly have their careers in the communications and electronics development laboratories of industry and the government. The Laboratories will, of course, be interested in the Fellows as candidates for employment. Yet acceptance of the fellowship implies no obligation of either the Laboratories or of the Fellow for his later employment by the Laboratories.

It is hoped that this fellowship program, in addition to increasing the supply of men trained to the doctoral level in communications and electronics technology, will accelerate the trend toward a larger amount of graduate training in all technology.



Constructive relationships on the job come about through definite efforts as well as because human beings derive satisfaction from effective mutual accomplishment

THE HUMAN SIDE OF SUPERVISION

C. RUSSELL DEYO

*General Information Manager, SOUTHWESTERN
BELL TELEPHONE COMPANY*

Note: How telephone workers feel about their jobs, their supervisors, their companies, influences the attitude of their friends and acquaintances toward those companies—and thus affects their standing in the community. We asked Mr. Deyo, therefore, to constitute himself an “inquiring reporter” with reference to such matters. Recently he has talked informally about their problems and informational needs with many first-line supervisors of the Southwestern Company. He contributes the following article not as the findings of an expert in this field but only as a report on how sincere efforts to create mutual respect and a harmonious atmosphere contribute to the accomplishment of group undertakings. EDITOR.

A CHIEF OPERATOR sits thoughtfully at her desk, wondering what to do about the girl who has just been transferred from another town. The girl says bitterly that she doesn't like it here. She doesn't like the people, or the office, or the town.

A chief switchman weaves his car through a big city's traffic on his way to work, his brow furrowed with concern over a story that was repeated to him as he left work yesterday. One of his men had told a friend, “The boss is gunning for me.”

An Accounting supervisor runs his eye down the latest results report, his mind on the girl who has been accusing others of not doing their jobs right, complaining that they have it in for her.

Deep concern and countless hours of thought go into the handling of incidents like these. Yet just such situations are the reason why so many supervisory people say that their greatest problem and at the same time their greatest satisfaction is in getting along with people.



They did, with gifts and visits and cards. When the illness had passed, it was a different operator who returned to work, her eyes dancing with happiness at being back among her friends.

But things worked out very differently in the case of the Plant man who said his boss was gunning for him. He was a young man, the youngest in the office. The chief switchman made it a point to stop beside him early that day and ask how things were



So, let's go back and see what happened in those three cases.

First, there was the operator who didn't like her new town and its people. Over a period of weeks the chief operator talked with her many times, trying hard to understand just what she didn't like, just what was really troubling her, hoping to learn how to make her happier. The stakes mounted as time went on. The operator was experienced and competent, but her attitude began to upset those who worked with her. If the situation worsened, service could be affected.

Then one day the unhappy operator was taken to a hospital for an emergency operation. The chief operator said, "Girls, let's go all out for her. Let's show her what kind of people we really are."



going. The young man said he guessed they were going all right. The chief switchman complimented him on the good job he had been doing. At that the young Plant man looked at him sharply and asked, "Good enough to hold my job no matter what?"

In the conversation that followed, the chief switchman learned that a rumor of

future force cuts had been passed around the office. Knowing that he had the shortest service of all the men in the office, the young man had worried about several assignments he had been given in recent months and had begun to wonder if his supervisor was trying to prove he couldn't do them well. He began to feel more and more certain that a case was being built for laying him off.

"I understand the plans were okayed last week for two office additions here in town," the chief switchman said with a smile. "Does it seem to you that we'd lay off cen-



tral-office men when there's even more work ahead than we have now?"

The young central-office man thought for a minute. Then his face brightened. "I wish I'd known that before. Would have saved me some sleep." He went back to work and there was no more talk about his boss being out to get him.

And what about the third incident—the case of the Accounting girl who was so critical of others in the office?

Her supervisor searched his mind for ways to help her adapt to the group she

worked with. In interview after interview he tried to find out what led to her attitude toward the others. He tried reasoning with her. He tried encouraging her. He tried being firm.

Occasionally, after a talk with him, she seemed to get along better with the others for a short time. But soon she would again be refusing to join them for lunch, and would accuse them of not handling their jobs well. A good worker herself, she had passed others until it was hard for them to do a good job. Her supervisor got only one clue to the cause of her attitude. She felt that when she had been in school, her family had praised her older brothers and sisters while paying little attention to her accomplishment.

One day her supervisor's problem was ended. She married a young soldier and resigned to go with him to a new station. The others in the office felt relieved, but the supervisor still puzzled over his failure and wonders if there was anything he might have done to help her adapt to the office.

ONE COMMON THREAD runs through these three incidents. A hard try was made to solve them. A hard try was made to find a way to satisfy everyone. In other respects they differ. In one case, no solution was found. In another, a generous, warm-hearted act solved the problem. And in the third, a key piece of information spiked a groundless rumor which threatened trouble.

Happenings like these occur every day, every hour, in cities and towns across the nation. And much free advice has been given on how to handle such incidents constructively.

This makes it difficult to keep the job of working with people in its proper per-

spective. It is all too easy to spotlight the problems and to overlook the large areas of human agreement and cooperation.

Just as a newspaper's headlines call attention to the world's troubles, so people are inclined to point to the relationships which go wrong. Actually, the significant thing is that so many things are right—that people continue to place so much trust and confidence in each other.

There's nothing dramatic in potential problems that are solved by positive action before they materialize. These are the good things you seldom hear about—yet they also are there by the thousands. The secret lies in working with people so as to establish a sound relationship.

As one chief switchman said, "The secret of good morale is treating your people the way you would like to be treated. When I've got a job to do, I get my boys together and say, 'How do you want to do it?' They're smart fellows and when they line up their own job, they do it better and faster than if I try to tell them how I want them to do it. When an American makes a commitment, he will generally break his neck to meet it. I try to get across to them that this is their business as much as mine."

Such a positive approach pays off in personal satisfaction as well as results. This same chief switchman said:

"I've developed four supervisors out of my crew and have just recommended a fifth. Every one of them is a top-notch man. That's a wonderful satisfaction."

This man is working constructively with people. And so is the chief operator who said, "Being friendly, being interested, being helpful are the keys to getting along well."

This chief operator holds regular meet-

ings with the girls in her office to encourage a free interchange of information and ideas.

"After the meetings started," she said, "my results went up, up, up."

She has concluded, however, that there is no single solution to good morale. "It's like the three-legged stool, or maybe a four-legged chair—there's good communication, good organization, and recognition that go into it. And, of course, there's listening. We get communication through listening at all times and through meetings."

Approaches to such matters differ with different supervisors. What is natural and



easy and effective for one is foreign and ineffective for another. One finds it easy to jolly an unhappy person into better spirits. Another does not. And most supervisors, no matter what approach they find easiest, agree that they must vary their approach with different people.

Another chief operator expressed it this way: "It would be nice if there were rules you could always use in dealing with people. It would be nice if there were a formula you could apply in certain situations. But you can't apply the same rules to different people. You can't even apply the



same rules to the same person at different times. On different days they feel differently."

The time and thought which supervisors spend over such decisions naturally raises the question of just why this seems so important to them.

A chief switchman answered that question this way: "I can't do the job. The men do it. It will be a good or bad job depending on how they do it. All I can do is help them. Their feelings about each other and about me, their feelings about the job, will decide how good a job it is."

A manager maintained, "You can't separate good morale from a good job. They just have to go together."

A chief operator pointed out, "If a girl has a problem, it just has to be solved if she's going to be a good worker. And if she stops being a good worker, pretty soon she starts affecting the other girls' work."

And, of course, everyone likes to live and work in a pleasant atmosphere, as free as possible from human misunderstandings.

To get such an atmosphere takes effort. It takes thought. And it takes precious time. Most supervisors will say that it helps

a lot to treat others as you like to be treated. As in the case of the operator who didn't like her new town, friendly, generous treatment of others usually brings a warm response.

It helps to put oneself in the other person's shoes, in order to understand them better. "I always try to remember how I felt when I was a new operator—all confused and afraid of doing something wrong," a chief operator said.

And it helps to keep people well-informed. A key piece of information has helped solve many problems, as it did with the young Plant man who was worried about his boss and his future. People whose questions about the business are answered freely and fully, people who understand the reasons behind the things they are doing, feel better about their work.

A MAN WHO works with a large group of Accounting girls pointed out that you never know what lies behind an employee's question. "I had a girl ask me if she could get her stock a little early so she could get the dividend. I didn't know, but I found out and told her. After that I learned she had been telling others she had heard that top officials of the company could get their stock and dividend, but the rest of us couldn't. My answer to her question had stopped the rumor cold, and I never knew it till later."

In planning new work, in working out new practices, it's helpful to get the participation of employees, most supervisors agree.

"This," as one supervisor put it, "is not just faking. They're smart people. They have a lot of good ideas. Their advice is good advice and it's worth getting."

And of course every fine human relationship stands on a solid bed rock of personal

integrity. Trust in another human being must rise from a conviction that the person can be trusted, is worthy of being trusted. "You can't mislead people and get away with it for very long, and I don't try," a chief operator summarized it.

People also work better in an atmosphere of approval, supervisors say. An Accounting supervisor, for example, pointed out, "When people go out of their way to compliment me for a good job, I feel like working my head off for them. When they don't, I don't feel as interested in my work. I think everyone feels that way."

Does this mean there's no place for firmness in dealing with people? Emphatically not. There is a time and a place for firmness. People respect the person who is firm at the right time. Like pepper, firmness can be the seasoning of human relationships. But its over-use, often tempting to a man or woman in a hurry, can diminish respect and loyalty.

Such ideas keep turning up in various forms, in various words, when one talks with a number of supervisors as I have recently done.

"Get to know your people," supervisors say. "That's the first thing to do in a new job. That comes before making changes in the way the job is done. Get to know your people."

Sometimes that's easy to do. But what if the other person won't communicate? What if you can't seem to talk with him? Then the job of getting to know him may seem just about impossible. As one supervisor said, it becomes "the toughest job we have to do."

But if one is to understand another person, there must be free communication in both directions. If one is to understand, he must listen and try to guess the thoughts

and feelings that lie behind the other person's words.

Although one supervisor says, "All you can do to get to know your people is be around them, give them lots of chances to talk to you, and listen," others go to great pains to break down invisible barriers which hinder getting to know and understand their people. A chief operator says she sits in the locker room at lunch time so the girls have a chance to talk with her. Plant men make it a point to take part in "bull sessions" when they think it will help.

THIS, THEN, is another challenge to supervisors—to surmount these barriers. The encouraging thing is that so much thought and study and effort go into the attack upon them.

For supervisors concern themselves seriously with the problem because they feel the alternative to its solution is ordering people to do things in a certain way. And most supervisors are eager that their employees do things because they want to do them the right way, rather than because they are ordered to. They know that this will get a better job done, and make relationships more pleasant for everyone.



HEADQUARTERS SUMMARY

June 15 to
Sept. 15, 1955

A LOW-POWER RADIOTELEPHONE SYSTEM is being used to provide communication between a test center and a telephone installers' supply truck in one district in Philadelphia. The truck is used to supply installers within a radius of eight blocks, and they rely on the common truck for all supplies and tools which can not be hand carried. Fast and reliable communication between the truck and the test center is essential.

The trial of this method of operation using radio communication has been very successful and Bell of Pennsylvania plans to extend the method to other districts.

A NEW METHOD OF RINGING underwent trial at Americus, Georgia, from June 17 to August 26 on four lines with 28 stations. The new method of signaling works satisfactorily over both rural "P" carrier and voice circuits with a maximum length of 18 miles.

This new ringing mechanism consists of an in-voice-band tone oscillator in the central office, replacing the normal ringing machines, and transistorized receiver units in the telephone subsets in place of bells. The receiver reproduces the tone received from the central office, and a transistor amplifier is used to obtain a satisfactory volume of tone to be heard by the subscriber. This provides a pleasing tone similar to a bell, since it is interrupted at approximately the same rate that the clapper hits the bell.

A SPECIAL SALES MEETING was held with the Companies by closed-circuit color television on Monday, August 15, to review a "Flowers by Telephone" plan to promote more long distance telephone usage among retail florists for intercity floral deliveries. This was the first Bell System sales meeting to use closed circuit TV. The program originated in New York and was carried to 47 cities for viewing by sales and other representatives of all Companies.

APPROVAL HAS BEEN GIVEN by the Federal Communications Commission for establishment of a submarine cable communication system connecting the United States mainland and the Hawaiian Islands, to be ready for service early in 1958. The twin-cable system will have practically the same design as the transatlantic cable—now being constructed—

and the cable to be laid next year between Ketchikan, Alaska, and Port Angeles, Washington, near Seattle. Present telephone service between Hawaii and the U. S. is furnished jointly by A. T. & T. and the Hawaiian Telephone Company by means of radio circuits. Demand for service is expanding rapidly, making it necessary to supplement existing facilities.

AN INTERDEPARTMENTAL "TASK FORCE"—with representatives of Western, Bell Laboratories, and O. & E.—has recently been organized to study methods, practices, and procedures relating to the provision of central office equipment. The fundamental objective will be to devise ways and means of shortening intervals between the start of engineering and the equipment service date.

The over-all interval from engineering start to equipment service date has remained substantially the same for some time—for a typical dial unit, roughly 22 months. Many time-reducing innovations in construction of homes now make it possible for new communities with large demands for telephone service to spring up in much less than the 22 months required to provide central office equipment.

DETAILED COST STUDIES from approximately 350 Independent telephone companies covering about 600 exchanges and over 600 Independent company toll routes have been completed. These studies are intended to provide a cross-section picture of Independent toll costs incurred in handling jointly rendered business. The study data will be used by Associated Bell Company people and representatives of the Independents in reviewing present schedules used in settlements, and possibly to form a basis for some revisions in present schedules if the cost results data indicate changes are needed. The United States Independent Telephone Association has maintained an office in New York for the last six months to facilitate early completion of the studies and to act as a "clearing house" for Independent companies which were participating. The entire study has been a joint undertaking of the United States Independent Telephone Association and the Bell System Companies, with coordinating assistance from

Headquarters Summary

various A. T. & T. headquarters groups directly concerned.

THE FORMER WANAMAKER BUILDING at Broadway and 10th Street in New York City has been found to be well suited for handling the new A. T. & T. Convertible offer of Twelve Year 3½s, due October 13, 1967. The offering ratio of \$100 of debentures for each 8 shares of stock established the exact amount of the issue at \$637,165,800. The conversion price was set at \$148 per share.

At this writing, toward the end of the subscription period closing on October 13, the offer has proven popular with both share owners and other investors. More than 335,000 subscriptions have been received to date, and it is estimated that they will exceed 500,000 in total. By far the largest dollar amounts of subscription are made in the closing days of the subscription period, when it is expected that more than \$375,000,000 in payments will be received.

THE A. T. & T. COMPANY'S WELCOME to each new share owner includes a copy of the illustrated booklet "A. T. & T.—Your Business." This booklet carries with it an invitation, in the form of a returnable check list, to ask for any of six other publications which may help the new share owner better to understand various aspects of the business in which he has just acquired a segment of ownership.

During the last year or so, the attraction of the name *Alexander Graham Bell* has made the pamphlet bearing this title the one most often requested. In 1955, the two next most popular pamphlets—"The Magic of Communication" and "The Telephone Almanac"—have edged up, with the result that requests for all three ranged between 1,250 and 1,300 during the first eight months of this year. "Early Corporate Development of the Telephone" and "The Story of Western Electric" have each run about 950 copies, with requests coming for about 800 copies of "The Telephone in America."

In all, during the first eight months of 1955 about 1,700 new share owners have asked for nearly 6,000 copies of these booklets, and there should be an upsurge in demand after the middle of December as additional share owners come in through conversions of the new debentures.

THE RESULTS OF A SURVEY of current information on the residence market for long distance telephone service have recently appeared. The findings, based on interviews with residence customers made by several market research agencies on a random basis in each of the Associated Companies, should be helpful to the merchandising activities of Long Lines and the Associated Companies. In all, 15,173 interviews were conducted, about 41% being with men. The results, which brought up-to-date a somewhat similar survey held in 1949, were weighed in terms of the interviewers' appraisal of the customers' economic status, educational background, and urban, suburban, or countryside situation.

AS OF SEPTEMBER 15 the Bell System television network linked 372 broadcasting stations in 246 cities. In addition, network service was available to 12 broadcasting stations in 10 Canadian cities.

A NEW MINIATURE AMPLIFIER constructed at Bell Laboratories combines a transistor with several other miniature components to achieve extraordinary electrical performance suitable for very wide-band services, such as television transmission. This experimental model is little more than 1½ inches long and ⅜ inch in diameter, and represents an important step toward the eventual use of transistor amplifiers in broadband transmission networks.

A POWER-DRIVEN WRAPPING TOOL was developed at Bell Laboratories not long ago to speed up the connecting of wires to terminals before soldering. This eventually led to the introduction of solderless wrapped connections. A recent Laboratories' development in this field is the combination tool, which cuts the wire, skins it, and wraps the connection, all in essentially one simple operation.

A TINY NEW ELECTRONIC DEVICE made of extremely pure silicon shows promise of reducing the cost on a large scale in many industries using electric power. This simple device, a silicon power rectifier, provides 5,000 times more current than conventional rectifiers of the same size. Two of the new rectifiers, when made about the size of peas, linked together, and mounted on a cooling fin, will furnish more than 20 amperes of direct current at 100 volts.

DIRECT-LINE TELEPHONES connected to a centrally located control console constitute a new municipal emergency reporting system recently designed at the Laboratories. The new system enables persons placing fire alarms to talk directly with fire headquarters from telephones mounted at street corners. These new call boxes can also be used for summoning police or ambulance service.

WESTERN ELECTRIC HAS PURCHASED the 430,000 square-foot United Wallpaper plant at Montgomery, Aurora Township, Illinois. The one-story building, situated on 46 acres along the Fox River, will be operated as part of the Hawthorne Works and will be used for production of dial switching equipment to meet increasing demands for telephone service. The new location will employ upwards of 1,500 employees, and will be in full operation in 1956.

GROUND BREAKING CEREMONIES were held in June for a new addition to Western's Allentown Plant which will add some 300,000 square feet to the present 435,000 square feet of floor space used for the manufacture of

electronic products. Pennsylvania's Governor George M. Leader participated in the ceremonies and construction work got under way immediately following. The building is expected to be completed by early 1957.

Construction has also begun on Western's new Kansas City, Kan., distributing house serving Southwestern Bell Telephone Company, which will replace rented quarters now being used in Kansas City, Mo. The new building, situated on a 38 acre tract, will provide some 200,000 square feet of floor space and is expected to be completed by late summer 1956.

A VOTE OF CONFIDENCE has been received by three of Western Electric's manufacturing locations. The plants in Allentown and Laureldale, Pa., and Lawrence, Mass., have qualified all of their products under the Reduced Inspection Quality Assurance Control Plan of the U. S. Army Signal Corps. Under RIQAP, the Signal Corps discontinues its regular inspection procedures and instead relies on the Company's quality control system and records, supplemented by periodic unscheduled spot checks of small samples of the product.



ONE MAN who was, if not glad, at any rate relieved at the course followed by the early season hurricanes described elsewhere in these pages was C. C. Duncan, who contributed "Transatlantic Telephone Cable Puts Out to Sea" to our previous (Summer) issue. For not until September 21 was the eastern end of that cable safely put ashore at Oban, Scotland, and this year's task completed. Mr. Duncan still shudders when he thinks what a vicious hurricane athwart HMTS *Monarch's* course could have done to the schedule and the whole delicate operation.

Mr. Duncan had already been through one episode which left him a bit breathless. While he, ashore at Clarendville, Nfld., was talking

over the cable with Captain Betson aboard the *Monarch* 1450 miles at sea on the long eastward leg of the voyage (the return half of the conversation reaching Clarendville by radio telephone), the captain suddenly announced that a loud speaker had been set up on deck and that the members of the crew—about 125 strong—would like to hear a few words from Mr. Duncan.

Taken unaware, and entirely unprepared, Mr. Duncan managed to thank those sturdy Britishers in what he hopes was an appropriate, cordial, and sincere fashion for their contributions to the advance of international communications. But since the hook-up to the loud speaker was strictly a one-way circuit, he

Headquarters Summary

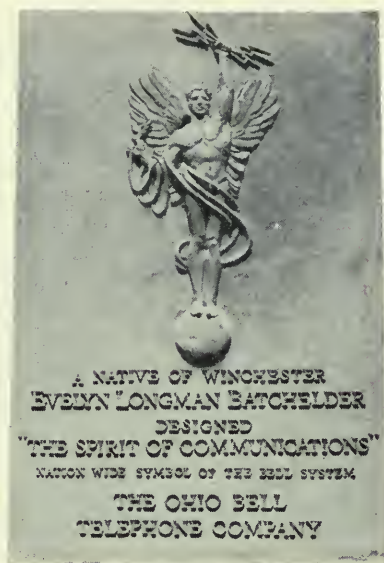
doesn't know to this day how his remarks sounded, out there amid the waste of ocean, nor how they were received.

SAID PRESIDENT EISENHOWER in the course of an address at a graduation ceremony last June, "In this country we emphasize both liberal and practical education. But too often it is a liberal education for one and a practical education for another. What we need is *general* education, combining the liberal and the practical which helps a student achieve the solid foundation of understanding—understanding of man's social institutions, of man's culture, of the physical, biological, and spiritual world in which he lives. This kind of education is sorely needed in this country—and throughout the world."

Mr. Eisenhower couldn't have read then the discussion of educational objectives and ideals which appears on these pages from the pen of John Markle II, for it hadn't yet been written in that definitive form. It may be, of course, that Mr. Markle was cognizant of those words from our nation's president. It seems more likely, though, that these and all such observations share in a common source—the bourgeoisie interest in a fuller education—and that it is but coincidence that causes them to reflect a feeling which is inherent in our times.

"THE GENIUS OF ELECTRICITY," clad in the glitter of gold leaf and holding aloft his thunderbolt while telephone cable encircles him, has stood symbolic atop the A. T. & T. Building since 1916. He first appeared in the cover design of the *Bell Telephone Quarterly*—predecessor of this MAGAZINE—in 1934, and has had his place in or on every issue since that time. We have long enjoyed his emblematic grace and have felt toward him the loyalty of close association. It was not until he was put to work on the covers of telephone directories that he was nicknamed The Spirit of Communication.

As is generally known, he was designed by Evelyn Longman (Mrs. Nathaniel Batchelder), who won with him a competition in which eight sculptors took part. We commented regretfully, in our issue of Spring 1954, upon the sculptor's death; and we are therefore happy to report that a plaque commemorating Evelyn Longman Batchelder as the designer of The Spirit of Communication has been placed on the wall of The Ohio Bell



Telephone Company's new building in Winchester, Ohio, where she was born.

NOBODY IN the eastern part of the United States needs to be told what our cover represents. The flags are flying for Connie and Diane—and not in celebration. Even as this issue was being prepared for the press, Hilda and Janet brought suffering and loss to our neighbors below the border, and a particularly vicious Ione caused loss of life and wrought damage in the millions along the seaward reaches of the Carolinas and threatened the battered Northeast anew before it took a sudden turn to sea.

Our cover was painted in oils by Charles Mazoujian; and since it may have special significance for some, a few reproductions have been prepared without lettering and will be available while they last to telephone people who will ask the editor for them.

Anyone who at this date is still interested in reading a general account of what it was like to live a night in one of New England's flood-swept little cities should seek out the September 17 issue of the *New Yorker* magazine and turn to "Across the Mad River," by John Hersey—the author who made the raw facts of Hiroshima real to an uncomprehending people.

IS IT THE new outdoor telephone booths, springing up along so many highways—light, colorful, and a welcome sight to many a stranded motorist—that account for our grow-



ing consciousness of this public convenience at every hand? Our contemporary, Western Electric's *WE* magazine, appears to think so, affirming that anything taken up by the cartoonists has achieved acceptance. And it cites a cartoon in a recent *New Yorker* in support: a vast sweep of highway crossing a lonely and limitless desert; beside the highway a telephone booth, and in it a motorist who is saying frantically, "Operator, where am I?"

Outdoor telephone booths are not a novelty, of course. One of our favorites stands at the entrance to the Mystic Marine Museum at Mystic, Conn. When the need for it developed, three years ago, somebody in the Southern New England Telephone Company had the inspired good sense to search the banks of the Thames River, near by, for some structure which would serve as an appropriate if unconventional booth. There lay the steamer *Miranda*, her usefulness ended, her hulk rotting—but her pilot house intact. Lifted from the deck, the pilot house was hoisted on a barge, brought to the Museum's dock, and installed on a new concrete foundation. So now that essential part of the *Miranda*, gleaming with paint and gold leaf, windows and wheel and binnacle intact, shelters those who would talk with others while they look out over waters the old lady will never sail again.

That's the first part of the story—and a satisfying yarn it is. The sequel is more difficult to tell, simply because it is so personal that the "editorial we" gets in the way. Let's just talk about the editor in the third person and get on with this tale of a strange coincidence.

Three years ago there came across the editor's desk the issue of the Southern New England Company's *Telephone Bulletin* for May containing the story of how *Miranda's* pilot house was being given an extended career in a different field. It was a Friday night, he and his wife were on the way to Providence, R. I., at the head of Narragansett Bay, to visit his wife's parents, and he put the *Bulletin* in his pocket to read on the train. That night he said to his wife's father, who had had maritime interests for many years, "Dad, didn't you have a vessel named *Miranda*?" and showed him a picture of the pilot house in its new setting.

"She was once mine," said the elder man, "named for my grandmother." And he went on to relate how he had designed her, had supervised her construction in a Maine shipyard, and had had her brought down the coast and around Cape Cod—for there was no Canal at the turn of the century—and up the Bay to his docks. She served him for many years, until he sold her after the first World War.

So that is why the editor, when he takes his children to the Mystic Museum, can show them the name of their great-great-grandmother prominently displayed on—of all places—a telephone booth.

HAVE YOU, by the way, a favorite telephone booth? And if so, what about it? JSB



Who's Who & What's What

(Continued from page 143)

MIAMI, FLORIDA, is not exclusively devoted to the enjoyment of leisure, and one of the busiest occupations there is the furnishing of telephone service. That is where WILLIAM W. PENICK got his start, in the Plant Department of the Southern Bell Telephone and Telegraph Company, in 1941. Soon he moved over to the Commercial Department and up the coast as a sales representative and sales supervisor—with a year and more as a Connecting Company representative—before he landed in Atlanta, in 1951, again as sales supervisor. A year later he became a sales and servicing engineer in the Commercial Division of A. T. & T.'s O. & E. Department in New York, and after two years there he went to Syracuse as division service manager in the Commercial Department of the New York Telephone Company. Back in New York and the O. & E. Department since the first of this year, Mr. Penick writes his article in this issue of the MAGAZINE from the standpoint of his position as business exchange sales engineer.

William W. Penick



Henry T. Killingsworth

IT IS PERHAPS SIGNIFICANT of our country's increasing interest in education that this issue should include two articles on academic work at post-graduate levels—each with its own viewpoint, of course. DR. MERVIN J. KELLY joined the research division of the Engineering Department of Western Electric—predecessor of Bell Telephone Laboratories—in 1918. The Laboratories were organized as such in 1925, and Dr. Kelly served successively as director of vacuum tube development and as development director of transmission instruments and electronics before being appointed director of research in 1936—the position he held until he became executive vice president in 1944. He has been President of the Laboratories since 1951.



Mervin J. Kelly

IT WAS C. RUSSELL DEYO's contribution "Here Are the People Who Own This Business"—a description of 15 A. T. & T. share owners from coast to coast—in this MAGAZINE for Summer, 1950, which led to the request for his article describing relationships among employees in the same understanding, human terms. His Bell System career began in the Public Relations De-

partment of the Western Electric Company in 1941, but was interrupted while he served as skipper of a PT Boat in Philippine waters during World War II. He joined the Public Relations Department of the New York Telephone Company in 1946, and was editor of the *Telephone Review* when, in 1950, he changed base—and he has been since then general information manager of the Southwestern Bell Telephone Company in St. Louis.

EDITOR



C. Russell Deyo



AMERICA IS GROWING. All you have to do is look around you. There are new stores, new houses, new highways.

The population is rising — up 18 per cent in the past ten years. And the number of Bell telephones is increasing too — up 100 per cent since 1945! Yes, from 22½ million telephones in 1945, there are today twice as many: 45 million Bell telephones serving you, your business, and your government in all parts of our bustling nation.

It's been a big job — doubling the number of telephones to meet your needs over the last ten years.

What did it take?

Well, in the first place, the service had to be good — useful, dependable and convenient — or you wouldn't have wanted so much of it.

And that meant an enormous building job for telephone people. It meant stringing wires and laying cables. It meant putting up new offices and buildings to hold the switching equipment needed. Many of the problems were made easier because Bell Telephone Laboratories came up with efficient new methods and equipment. This equipment was produced in quantity by another member of the telephone team, Western Electric.

Over these ten years, as the number of telephones doubled, you were making more phone calls from city to city. We have tripled the capacity of our Long Distance networks. Part of this job has been to put up radio relay towers and lay coaxial cables to carry phone calls as well as television programs that can now reach 217 cities.

In these years we have met the needs of national defense — helped to create Nike, the guided missile that guards our cities — built radar stations to warn against surprise attack. And we have provided vast amounts of all kinds of service and equipment essential to the safety of our nation.

Yes, this has been a big 10-year job. It required a great deal of money: seven and one-half billion dollars in this growth. You and your neighbors have been the ones who made this expansion necessary. Your use of the telephone demanded it. Your confidence in our future has made this large investment possible.

Telephone men and women are proud to have met the challenge you placed before them. They welcome the challenge that lies ahead.

And we make you this promise: — We will do our best — at Bell Telephone Laboratories, at Western Electric, and at your telephone company — to keep growing with your needs and with our nation — to make the service better and more convenient every year.

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Bell Telephone Magazine

A non-technical review, published quarterly to give Bell System management people a broader view of the history, objectives, operations, and achievements of this business than they might attain in the course of their day-to-day occupations, and an added sense of participation in the problems and accomplishments of our nation-wide public service.



A MEDIUM OF SUGGESTION and A RECORD OF PROGRESS

Cover: The Bell System and Television. Painted for this Magazine

Charles Mazoujian

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JUDSON S. BRADLEY, *Editor*

SALVATORE J. TAIBBI, *Art Editor*

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CLEO F. CRAIG, *President*

S. WHITNEY LONDON, *Secretary*

JOHN J. SCANLON, *Treasurer*

Who's Who & What's What

IN THIS ISSUE

SINCE JULY OF 1951, CLEO F. CRAIG has been President of the American Telephone and Telegraph Company. His Bell System career, beginning in 1913, illustrates how broad may be a man's experience within one organization. For his assignments in the Long Lines Department took him from St. Louis to Kansas City and Atlanta en route to New York, and to such diverse posts as district plant chief, plant accountant, and construction supervisor, among others—with a six-year interval as a special representative in the A. T. & T. General Department—before he became general manager of Long Lines in 1933. He was elected Vice President in charge of the Long Lines Department in 1940, and the

Cleo F. Craig



Major General Gordon A. Blake

following year moved to A. T. & T. headquarters. There his vice-presidential responsibilities included, in turn, charge of the departments concerned with Personnel Relations, Operation and Engineering, and Finance and Revenue Requirements.

The foregoing is reprinted from this MAGAZINE of just a year ago, in which was published Mr. Craig's "Big Business and the Community." At the beginning of 1956, it still seems appropriate as a brief statement of an outstanding telephone career.

GORDON A. BLAKE was born in Charles City, Iowa, in 1910, and lived there until 1927.



*Will Whitmore, right, with
narrator John Nesbitt*

He was graduated from the United States Military Academy in 1931, and from advanced flying school a year later. After a tour of flying duty, he completed the Signal School, Fort Monmouth, N. J., and became a communications instructor at Chanute Field, Illinois. General Blake served overseas in Hawaii and Alaska during the period 1939-1945. Upon return to the Zone of Interior he served successively as Deputy Commander, Airways & Air Communication Service, student at the Air War College, with the Electronics (Engineering) Division and Armament Laboratory at Wright-Patterson AFB, and Vice Commander of the Wright Air Development Center. He became Director of Communications—Electronics, Headquarters USAF, in February 1953. Major General Blake has been awarded the Silver Star, the Legion of Merit, Navy Legion of Merit, Distinguished Flying Cross, and Air Medal during his career.

A FREE-LANCE WRITER on business subjects and then a staff writer on a trade journal, from 1922 to 1929, WILL WHITMORE joined the Public Relations organization of the Western Electric Company in the latter

year. There he became advertising supervisor in 1935 and advertising manager 10 years later. It was in 1948 that he moved to A. T. & T's Public Relations Department as radio advertising manager. The expansion of his duties is indicated by the changes in title: radio and exhibit manager in 1952, and now the inclusion of "TV"—as shown at the head of his article. While he does not really commute between New York and Hollywood, he has taken advantage of the hours required by his frequent journeys recently between the two coasts to put down on paper his present contribution. He is shown here with John Nesbitt, who will be the narrator on the A. T. & T.'s TV program.

THE PREVIOUS ISSUE of this MAGAZINE, with its very full accounts of last Autumn's hurricanes and floods, gave JAMES W. COOK an opportune text on which to base this issue's "guest editorial." Perhaps some of our readers, when next they hear of the quick and efficient restoration of telephone service after some catastrophe, will have a broader understanding of all the factors

(Continued on page 283)

James W. Cook





ON THE WAY TO THE DEW LINE

Ships of the Military Sea Transportation Service passing through ice fields as they carry building equipment and supplies for the construction of the Distant Early Warning net across the top of the world.

"Progress means that you are extending the sense of responsibility to those who lacked it before and are deepening it in those who have it already"

EQUIPPING OURSELVES FOR TODAY'S RESPONSIBILITIES

CLEO F. CRAIG

President, AMERICAN TELEPHONE AND TELEGRAPH COMPANY

At the annual dinner of the Alumni Society of the Wharton School of Finance and Commerce in Philadelphia on November 14, the society's Gold Medal of Merit was presented to Mr. Craig as the man who has made the "greatest contribution to American business" during 1955. After a brief greeting, Mr. Craig addressed the following remarks to his several hundred listeners:

YOU HAVE MY deepest appreciation for the honor signified by this award. I feel sure that in presenting it, you are also recognizing the contribution made by all the people of the Bell Telephone System to our community and national life. For them as well as for myself—thank you so much.

If you don't mind, I'm just going to talk along informally, and I'll begin by mentioning two projects that telephone people are working on, as they seem to lead naturally into the rest of what I want to say. One is the new transoceanic telephone cable, the first ever to be laid, which we expect will be ready for service between this continent and Great Britain about a year from now. The other is the so-called Distant Early Warning Line in the Arctic, where a picked team of Bell System men is

installing a chain of radar stations that will give us warning of any air attack that might come from over the top of the world.

The job in the Arctic is being done at the request of the United States Air Force by a group drawn from telephone operating and manufacturing units and from our research laboratories. The transatlantic cable is a joint project of our company and of communication agencies of the British and Canadian governments.

Last June when the cable-laying started, going east from Newfoundland, I had the privilege of being aboard ship. It is quite an experience to watch a cable that has behind it perhaps a quarter of a century of work settle in the Atlantic at six knots an hour, and to see, every 40 miles or so, an amplifier or voice booster that has been

built into the cable structure with the most painstaking care slip under the waves. As you see it go down, you know that at that very moment, the vacuum tubes within the amplifier are alive with energy, and that for the next twenty years or more they will be giving fresh life to voice currents so that human speech will travel the depths of the ocean strong and clear.

Also, while I was on the ship, I couldn't help thinking of the good spirit which had made the cable possible. As each foot dropped behind us, part of it was British, part was American, and part was Canadian. All of it told of joint interest and joint effort, and all would contribute to joint well-being.

I have not had an opportunity to visit the work in the Arctic on the Distant Early Warning Line, but from talking and listening to the men who are managing the job I feel almost as though I had been there. The line of radar stations will reach for more than 1,500 miles, all the way across the northern rim of this continent. From each station, communications will be to

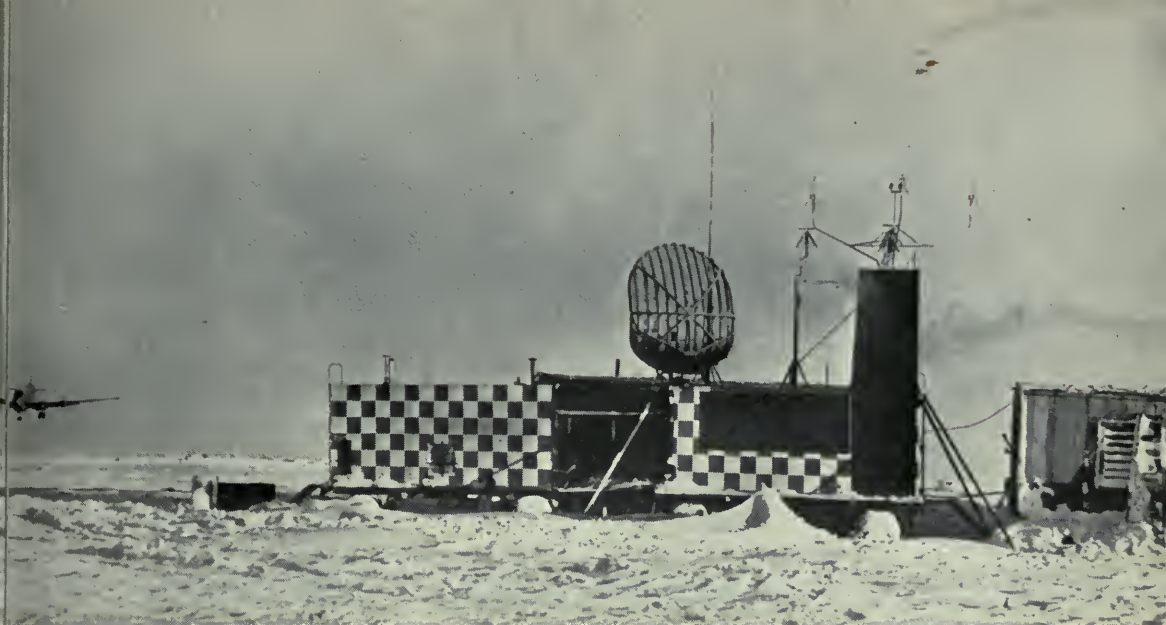
other stations in the chain and to the rear—to our neighbors in Canada, and to ourselves. The purpose of the whole enterprise is simply to give us a few hours' warning of danger on the wing, a few precious hours in which we may prepare our defenses.

What I have just said may make the far north seem rather near at hand, but when you look at maps and pictures you get a very keen sense of distance and remoteness. Up there on the ice—and some of the country is terribly rugged—men and instruments will keep watch day and night and through all kinds of bitter Arctic weather.

To establish each post—and there are many of them—a long and carefully organized sequence of work is required. First, for example, surveying and locating the sites. Then the first landings, in small planes equipped with skis. Then bigger planes that can bring in tractors. Then all the thousands of tons of materials for housing, engines and fuel, food, and other supplies. Then the construction work itself and, finally, the arrival, installation, and testing of radar equipment.

“ . . . the first ever to be laid, which we expect will be ready for service between this continent and Great Britain about a year from now.”





"... where a picked team of Bell System men is installing a chain of radar stations that will give us warning of any air attack that might come from over the top of the world."

You almost have to pinch yourself to realize that the communication art, and many other technical skills as well, have progressed to the point where such an installation is possible. Only a few years ago it could not have been done.

The implications of this Arctic job are quite different from those of the transatlantic cable. The cable is important from the standpoint of security too, but it speaks most eloquently of international friendship and good will. The warning line is a sort of sentinel that will ask "who goes there?" Behind one is trust. Behind the other, distrust. Yet both are alike in helping us to realize the profound effect of modern communication services on all our lives.

TODAY WE CAN HEAR MORE, see more, know and understand more of the world and its people than was ever possible for human beings before. Fast and abundant communications also help us to accomplish more and produce more. Thus technical advance keeps opening the way to new social gains.

At the same time, however, it presents us with new risks and responsibilities. For instance, every kind and shade of opinion can find wings today. Pressure groups can raise a greater din than they ever could in the past. The average man or woman nowadays is exposed to the heaviest barrage of good and bad ideas, arguments and solicitations, that has ever been fired, and the ammunition seems inexhaustible. Freedom of communications is vital, but it can also be confusing. If we are not going to be led by the nose, we have to think, study, balance, and choose. And most important, we have got to develop the breadth of mind to do this.

In this and other ways, technical progress seems to keep asking more of us. Many people today have misgivings about the onrushing pace of science and technology. This momentum is enormous, and there's little doubt in my mind that it will change the world even faster in the years ahead.

I can't hold, however, with those who are alarmed at the prospect. To me the opportunities are breath-taking and worth



“ . . . everlastingly operate for the good of the community. The community can't ride one track and business another. The two are inseparable, interactive, and interdependent.”

all the effort they call for. I have real faith that we will equip ourselves to meet them. But in order to do so, I am altogether convinced that we in industry must first measure and understand what our responsibilities really are. We have to learn them, we have to accept them, and we have got to acquire the knowledge and the discipline we need to discharge them well.

More than any civilization of the past, our modern industrial civilization relies on the free good will of men and women. We in this country have enjoyed the greatest degree of freedom and we have also advanced farther in industry. This is certainly no coincidence. The two go together.

But it is no coincidence either that our combination of freedom and industry has now brought this nation to a new place of responsibility in the world. If ever in the past it was necessary to argue the relation between the free and the responsible, it is

no longer necessary now. We read it in the headlines every day.

What is true in international affairs can hardly be less true at home. No one can accept responsibility in the world unless he takes it first on his own doorstep. So for us in industry I can see only one sure course to follow. Call it common sense, call it policy, call it anything you like. To my mind industry must aim for, exist for, and everlastingly operate for the good of the community. The community can't ride one track and business another. The two are inseparable, interactive, and interdependent.

I HOPE you don't think this is just visionary talk. I am quite aware that business is also a way of making a living. No business can succeed in serving the public well unless it succeeds financially and the people in it obtain reasonable rewards. I realize that the

Equipping Ourselves for Today's Responsibilities

pulls of self-interest are very strong, and furnish valuable incentives of their own. But let me ask this question: Ought not a sincere concern for the common welfare—the desire to help build the best possible community—shouldn't that be as much the goal of a business as it is of this Wharton School which for nearly 75 years has been training businessmen? I surely think so. Or I'll put it another way. Should we divide our population up in some manner between those who pursue the aims of business and those who want to work for the good of society? Who would say yes to that?

Certainly we in business management are trustees for our share owners. But in the world we live in—and I don't want any other—I believe we can only be good trustees for the share owners by fulfilling our trusteeship of service to the public. To me it is not conceivable that this nation, facing the tasks which confront it today, will be content with anything less.

Furthermore, we in management have found great value in encouraging the widest possible sharing of responsibility at all levels in the organization, and this can only be brought about when people feel they have a truly satisfying motivation—the most, not the least; financial reward certainly, but not that alone. The more we learn of human behavior, the more we find that human beings really do want to devote themselves to worthwhile goals. To nourish an individual's desire to grow, we in industry must help him find goals that he feels are worthy of his best efforts.

I agree that this is more a matter of creating a climate than of furnishing a map. And I don't worry too much about this kind of business policy tending to produce a type. A person is not necessarily less of an individual because he happens to share certain qualities with others. In fact, if he

doesn't share at least some of them, no one is likely to want him around.

To some extent any institution, whether it happens to be a business or a university, puts its stamp on the people in it. If the identifying mark tells of imitative thinking and mere conformity, that of course is not good. But if it is the broad mark of sharing in a joint endeavor, a common effort to really serve the community with the best one has to give, I don't care how many people I see wearing it. In that sort of association there ought still to be plenty of opportunity for everyone to grow individually as his talents permit.

Our problem is—as working men and women always busy with the day-to-day job—how can we do the most, and what activities will most reasonably help us, to become bigger people, with better understanding of social and public affairs—men and women broader in outlook, and thereby better able to see the ultimate as well as the more immediate effects of the decisions we are called on to make?

As one answer to this, it seems to me that everyone who shares the responsibilities of industry will gain at least something worth while from the deliberate effort to study the relation between his own work, the work of others, the activities of government, and the well-being of the community: to do this objectively and, in so far as possible, through participation in a group.

We used to hear the word "isolationism" applied to a large body of thinking in the United States. We don't hear it much any more, for the simple reason that it is no longer possible for us to isolate ourselves from world affairs. No business can be isolationist any more either. What other industries are doing affects us, what we do affects them, and government affects us all.

We have no choice but to learn and try to understand other points of view, to study public opinion, and do our best to contribute intelligently to it.

IN MODERN INDUSTRY our resources for this kind of study are considerable. But I would be pretty sure that we will never be self-sufficient. I am glad, therefore, that the colleges and universities are offering a wide range of opportunities for management training and education. Most of the time there are quite a number of telephone people going to school in institutions across the country, and I am confident they are gaining much from the experience.

At the same time, the telephone companies are carrying on various educational programs of their own, in addition to purely vocational training. One part of our

effort which I want to mention particularly is what we call the Bell System Executive Conference. I've talked a bit about this before, and if some of you have heard me I ask your indulgence for the repetition. Through these Executive Conferences we have brought together some 800 or more high-ranking people in the Bell companies in groups of 40 to 50 spread over a period of a little more than two years. They have lived, studied, and talked out problems together during four-week sessions. The speakers are often from fields other than business—the very best people we can bring in, with many different backgrounds. These talks by guest speakers always lead to questions and free discussion. I have met with most of the different groups and they have really given me a going-over.

But this program was conceived as a



"... a broad mark of sharing in a joint endeavor, a common effort to really serve the community with the best one has to give."



"Most of the time there are quite a number of telephone people going to school in institutions across the country. . . ."

starter only. This fall we are beginning a second series of meetings as a follow-up to the first series. We have also said to these men, who come from all over the country, "We hope when you go back home you'll see what you can do to get this kind of thing started in your own territories." And they are beginning to go ahead with their own programs. Truly I think they will have to, for of three things I am convinced. One is that success in business management, at least in a large business, depends on a wise distribution of decisions. The second

is that decisions which will best serve both community and company interests have to be based on genuinely broad considerations. The third is that any company that is going to be run this way must do all it can to help its people grow in outlook and stature.

Here at this meeting I can't fail to speak briefly of another activity we are carrying on through the coöperation of the University of Pennsylvania. This is the Institute of Humanistic Studies, which was started by the University in the fall of 1953 at the

suggestion of Mr. Gillen. The third session is now in progress, with 24 men from various Bell System companies taking part. About the same number attended last year and the year before. The course begins in early autumn and runs continuously until June.

This is an unusual experiment, organized to test the idea that a concentrated program in the liberal arts given to a promising man at the threshold of his mature years will significantly increase his executive potential and his stature as a man.

Will it do so? No one can answer that question now, but as time goes along we shall see. I will say this today: I am thoroughly glad we are making the experiment; and may I just say to Dr. Harnwell and to all his associates who are doing so much in our behalf—we are deeply grateful.

AND NOW let me come to the end of my remarks in this way:

Years ago I read with great interest a book on constructive citizenship by L. P. Jacks, then principal of Manchester College, Oxford. The other day I took it down from the shelf and browsed through it again. If you have read it, perhaps you will recall these words which sum up much of the author's thought:

"Society advances by extending the area of responsibility of its members. Progress means that you are extending the sense of responsibility to those who lacked it before and are deepening it in those who have it already."

This idea, it seems to me, offers much to all of us and I quote it here as a sort of concluding text for everything I have said.

You have been very kind in listening. Thank you for that, and again let me express sincere appreciation for the honor you have extended to me, and also, as I believe, to the men and women of the Bell System.

The SAGE System is explained as that portion of the air defense system which provides the means for the semi-automatic processing of data and weapons control

OUR AIR DEFENSE SYSTEM

MAJOR GENERAL GORDON A. BLAKE

Director of Communications, HEADQUARTERS, UNITED STATES AIR FORCE

SINCE WORLD WAR II, this nation has built up a new kind of peacetime economy. It is an economy which devotes over one-half of the Federal budget to military defense. Never before in the nation's long and prosperous history has so much money been devoted to defense in time of peace.

The American taxpayer has borne the high cost of this policy without complaint. The public, however, has an interest in what this cost is buying in terms of our military strength. The Department of Defense would like to report more information to the public more often. But we are frequently restrained by security considerations. The very defense we are all working together to create can be damaged by unwise or untimely releases of information.

One of the prime benefits, however, in publicizing and explaining defense problems is that it helps to secure coöperation from people in all walks of life. And one of the important things we need in our air de-

fense system is coöperation from the average individual citizen. After all, one of the prime purposes of the air defense system is to save the civilian population. Hence, it is particularly important that the average person take an interest in this system, and devote effort aggressively to learning his part in it.

I can tell you a little bit here tonight of just what the Department of Defense is doing to give you the best air defense system in the world. We know that this can be accomplished by making the system as automatic as possible, because it has become evident that some type of reliable, automatic operation is necessary to achieve the speed and efficiency the job calls for.

A good deal of this automatic operation is wrapped up in a project called SAGE. While this term is not completely strange to many of you—since it has appeared in various press releases—I suspect that some of you may share the misconceptions about SAGE which have resulted from fragmentary comments on the subject. This talk will be, in effect, a report to you on SAGE.

A speech before the Armed Forces Communications and Electronics Associations in New Haven, Connecticut, on October 27, 1955. Copyrighted by and reprinted with the permission of that Association, publishers of *Signal*.



A landing craft fends off an ice floe from one of the ships engaged in transporting supplies for the Dew Line operation.

First, what does the word SAGE mean? It is actually a short title derived from the words Semi-Automatic Ground Environment. The *Semi-Automatic* part is more or less self-explanatory, since it relates to the techniques employed to handle information. However, the *Ground Environment* part is a bit ambiguous. This is a term coined by the Air Force to describe the complex of electronic equipments installed at ground locations and used to provide some sort of operational service. In the case of SAGE, the operational service being performed is the handling of large volumes of information or data in solving air defense problems. In short, SAGE is a project for improving our air defense by applying semi-automatic operation to our handling of information and the direction of weapons. It is not a new air defense system but

rather a major improvement in the one we already have built and are operating today.

The need for semi-automatic operation becomes evident when you consider the great volume of flight information pouring into the system. This over-all volume possibly is as great in peacetime as in wartime. All aircraft flights must be watched and identified by the defense system. There are 30,000 scheduled flights per day, plus a great many more unscheduled. Information about these flights is fed to our defense system from 13 sources. Many of these sources are completely operational. Others are rapidly being developed and expanded.

The first is the heavy surveillance radars within the United States.

The second is the heavy height-finder radars. Height-finders are necessary be-

cause most surveillance radars do not give altitude.

Third, there are small gap-filler radars, between the large radar, to cover the gap which large radars cannot see.

Fourth, for civil aircraft, flight plans and other information are relayed from the CAA flight service centers.

Fifth, for military aircraft, similar information is relayed from the Military Flight Service.

Sixth, there is the Pine Tree line. This is the name given that part of the United States radar fence which laps over into Canada.

Seventh, there are our early warning lines. One is the Mid-Canada line, which extends across Canada from British Columbia to Newfoundland. The other is the DEW Line (Distant Early Warning) which extends across the top of Alaska and Canada. Plans for the arctic line were the subject of a joint Canadian-American announcement in September 1954. Overcoming the rigors of the arctic to establish the DEW Line has been one of the most dramatic accomplishments of the radar extension program.

Eighth, there are radars in southern Alaska.

Ninth, there are Navy picket ships along the Atlantic and Pacific coasts. These floating radar islands extend the land-based radar coverage for hundreds of miles out to sea.

Number ten, supplementing the coverage at sea are the Constellation AEW&C aircraft (Airborne Early Warning and Control). These giant aircraft are actually flying radar stations, each carrying five tons of electronic equipment and a crew of 18 men. They greatly expand the "seeing" coverage of the air defense system. AEW&C planes not only patrol a great area, but they

can lift radar several miles in the air to scan a much greater line-of-sight distance.

The eleventh source of information for SAGE is the radar on man-made islands anchored to ocean shoals off the Atlantic seaboard. These are called Texas Towers because they resemble oil derricks in the Gulf of Mexico.

The twelfth source of information is the Ground Observer Corps, the GOC. This is made up of thousands of average citizens who volunteer and donate their time to watch the skies a few hours a week. Radar can see through darkness and storm, but human eyes can still pick up essential information that radar cannot. We want to expand the GOC to one million sky watchers at 24,000 locations.

The thirteenth source of information is also important. It is the Air Weather Service. In order to successfully assign and guide weapons, we must know the weather. For example, in order to direct an interceptor to a specific point in the sky at a specific moment to make an interception, the computer must know how the wind will affect the speed of both bomber and interceptor.

The sum total of all data from these thirteen sources, pouring into our defense system today, is staggering. And it will be even more when all expansions now in progress are completed.

All of this information must be correlated and used by the Continental Air Defense Command—which we call CONAD. CONAD Headquarters, located in Colorado Springs, directs our entire continental air defense. It is a joint command. This means that applicable portions of the Army, Navy, Air Force, and Marines have been combined together under one military commander. This gives CONAD direct maximum access to defensive weapons in a maximum number of places. And it pro-

vides essential unification of authority, segregation of responsibilities, and, consequently, quicker, undelayed striking power.

CONAD has the authority, when an air threat occurs, to order weapons into action. There are Air Force interceptors on alert 24 hours a day, seven days a week. Or CONAD can order interceptions by Navy planes, to the extent of their availability, from carriers or shore stations. Army anti-aircraft guns or missiles can be used.

Simultaneously with ordering weapons, CONAD will alert the Federal Civil Defense authorities, the Federal Communications Commission, and the Civil Aeronautics Administration. Liaison representatives of each of these agencies are members of the battle staffs at each defense sector headquarters. To insure that civilian planning is complete, up-to-the-minute, and feasible, these agencies maintain continuous close contact with activities at CONAD.

Limitations in Information Handling

TO BE ABLE to properly exercise such far-reaching authority, CONAD must first process and evaluate all of the air situation data. Whether the system is manual or automatic, flight plans must be compared to radar readings. All air tracks must be numbered. Information as to bearing, distance, height, and speed must be continuously fed to subsector headquarters as the aircraft is tracked. (For air defense the country is divided into subsectors.) After identification as friendly, the information is voice-telephoned to the next subsector. Only when a plane cannot be identified is the information sent on to CONAD Headquarters. Under the manual system, each of these steps is performed by some indi-

vidual person. Many times one person must perform several steps. The radar operator must read a scope. Another operator plots the progress of flights on a huge plexiglass board. He may receive verbal instructions from a number of sources.

The manual system is so limited that each intercept control station can handle information from only one or two radars. To secure a picture of the air situation over a large area or even a small area, a hand-plotting job must be done at subsector headquarters based on reports from a dozen smaller stations. It is all done on a person-to-person basis.

What SAGE Can Do

THROUGH ORGANIZATION AND TRAINING, we have made the manual system as efficient as possible. But this is not the answer. Human capabilities are limited.

However, we felt from the very beginning—after putting many scientists to work to study the situation back in 1950—that the problems associated with mass data processing, and simultaneous control of many weapons, could be overcome. After several years' research, study, and experimentation by top-notch scientists and engineers, we believe that most of the problems have actually been solved—and that SAGE is the answer.

How the improved air defense system will operate, using the new semi-automatic devices, will be illustrated later this evening in a film called SAGE. The fundamental improvement which semi-automatic operation brings is not only greater speed but also greater accuracy, reliability, and capacity. This could never have been adequately done by manual methods. Under manual operation, the fundamental unit or building block was one radar. Under SAGE, a dozen radars can be automatically

linked together to give a much more informative and comprehensive picture of the air situation. As rapidly as the air situation changes, the composite picture in subsector headquarters will change. We can control and direct many times as many weapons as heretofore.

There are many electronics devices which will bring semi-automatic operation to air defense. The brains of SAGE is the giant electronic computer. Each sector and subsector will have one. In its memory drums many facts can be stored. As new facts develop, the memory drums can be automatically kept up to date. The computer can furnish, rapidly, solutions to complicated navigational and vectoring problems. One of its greatest benefits is its unflinching accuracy.

It can furnish a correct picture at the earliest possible moment to the subsector commander. The commander must evaluate the situation and make tactical decisions. Only a computer could assess and evaluate an air situation, in relation to location and speed of defense weapons, rapidly enough to produce the one best solution.

The semi-automatic operation of SAGE also includes a new converting device which changes radar information into a

signal form whereby it can be automatically transmitted and carried over class II telephone wires. In the past, the use of telephone wires was limited to voice or teletype. This device also permits radar to function unattended, except for maintenance.

Another automatic feature of SAGE is the data link. The data link is a radio transmitter and receiver. The transmitter is on the ground and the receiver is in the airplane. This will permit the giant computer to automatically transmit weapons control and flight instructions, with all the complex coordinates and numerical readings, to direct the interceptor pilot to the enemy bomber. When an interceptor is equipped with an auto-pilot, the aircraft itself can be automatically controlled from the ground. Automatic flight control, monitored by the human pilot, is required to meet the demands for accuracy caused by jet speeds.

Need for Communications

OUR CONTINENTAL AIR DEFENSE system today is heavily dependent upon communications circuits, to tie together all elements of the continental air defense. SAGE will increase our communications needs. As the speed and complexity of weapons increase,

A typical Dew Line scene above the Arctic Circle.





Arctic airlift: Shrouded in steam from engine pre-heaters, Air Force planes take on heavy construction equipment for the Dew Line project.

the electronic ground environment required to operate them becomes more complex. And communications is an essential element of this ground environment.

Within the continental United States today we lease almost all point-to-point communications for air defense, and other domestic military operations. Our air defense communications are an integrated network.

They originate from each volunteer ground observation post, and they originate from radar stations operated to detect and track aircraft. They run through the complex of direction centers and control centers to the Continental Air Defense Headquarters. This vast web of communications covers the country from coast to coast. It is derived through leasing circuits from the commercial telephone system of the nation.

For a quarter of a century it has been a firm policy of the military services to lease communications lines from domestic commercial telephone companies. This was not always the case, however. We arrived at this policy after years of trial and experimentation with different methods and media. For example, after World War I, the military had embarked on a policy of communications by means of their own radio

networks, rather than using telephone circuits. But early in the 1930's two primary reasons influenced the abandonment of that policy. First, the military services found that radio could not provide the same degree of flexibility and diversity of distribution that the domestic telephone commercial carriers could, with their extensive land line networks. Such flexibility and diversity could be duplicated by the military only at an exorbitant cost in money and manpower. Second, and equally important, was the problem of obtaining radio frequencies. They were increasingly needed by the military for overseas communications, and for other growing requirements such as the aeronautical service. Use of radio for domestic communications by the military, therefore, gave way to the leasing of commercial telephone land lines.

To provide the telephone communications required by SAGE will require the local realignment, regrouping, and augmentation of the telephone lines now utilized by air defense. But these are only the tentacles, the nerve ends we might say, in local areas throughout the United States that must be changed and augmented. The backbone of this system remains substantially unaffected.

Our Air Defense System

When the concept of SAGE was developed, five years ago, one of the basic assumptions tacitly made by the scientists was that such a system was feasible in the continental United States only because of the existence of a network of commercial communications land lines that has no counterpart in any other part of the globe. Today this network, operated by the Bell System and the Independents, represents a private capital investment of nearly sixteen and a half billion dollars. Since 1945 it has been growing at a rate of one billion dollars a year. And the demand from the public for better and more extensive service indicates that this rate of growth will increase, rather than decrease, in the foreseeable future. As an assistance to national defense, particularly in the air defense aspects, the telephone system is becoming a greater national asset each year.

We have also estimated that by 1960 it may cost as much as 240 million dollars a year for leasing the communications facilities required for air defense. Normally, this cost of leasing is computed, as it is now for all our leased communications, on the basis of government tariff rates established in the public interest by the FCC and local utilities regulatory bodies. These are applicable to rental of lines by the public in general.

The engineering of leased facilities to insure compatible operation of all elements in the SAGE system is an extremely complex job. Technical standards applicable to all elements must be rigidly adhered to. The entire web of existing communications in a specific local area must be engineered as an integrated whole. Such engineering must be carried out at one focal point for the entire system, if the system is to operate effectively. This focal point is the engineering department of the A. T. & T. Company in New York City. Participating

in this effort are representatives of the Associated Bell Companies and a representative of the U. S. Independent Telephone Association. We are also encouraging coordination with manufacturers who make equipment for the Independent companies.

As the engineering for each area is completed, the installation and operation of the required leased facilities will be carried out by local telephone companies in the areas in which SAGE direction and control centers are established. All companies, Associated Bell and Independents, will have an opportunity to provide the leased circuitry required for SAGE.

At present, the Air Force is leasing lines for all military purposes from about 600 telephone companies, 20 of which are Bell System and 580 are Independents. For SAGE nearly every corner of the country will be involved. Obviously, a great many telephone companies will participate. The number of companies participating cannot be predicted at this juncture. However, all the telephone companies of the nation are protected by franchises covering the areas they serve. Any company affected by SAGE will therefore have an opportunity to provide circuits required in its area. A waiver in favor of another company can be made only if the franchise holder volunteers it.

One last word about leased communications. I would like to stress that the communications lines required for SAGE will, in general, not be newly constructed in their entirety. The major portion will be derived from the vast network of commercial communications lines presently in existence. The value of these new extensions lies in the fact that they will be engineered and built to integrate with the over-all telephone system of the country. Only by this can we get the quality, flexibility, and reliability of service required.



The Navy's newest Early Warning radar blimp.

I would also like to stress that we are counting on teamwork and support of this program from all parts of our vast telephone system, including the many equipment manufacturers which serve that system. Our experiences in the past indicate clearly that such teamwork will be readily available. Also our specific discussions with both Bell System people and representatives of the Independent Telephone Association indicate that the service we need for SAGE will be provided.

A Specific Definition of SAGE

BEFORE TURNING TO OUR PROGRAM for implementing SAGE, I would like now to give you the specific definition of this project as we use it in our daily work.

The SAGE System is that portion of the air defense system that provides the means for the semi-automatic processing of data and weapons control. It consists of:

- a) Facilities to transmit air surveillance data from data-gathering sources to Direction Centers.
- b) Direction Centers, where air surveillance data is evaluated and developed into air situations, and from which weapons assignment and guidance is generated.
- c) Facilities to transmit situation data from Direction Centers to Combat Centers.
- d) Combat Centers, where data is evaluated and developed into broad sector sit-

uations, from which weapons resources can be monitored.

e) Facilities to transmit instructions from Combat Centers to Direction Centers.

f) Facilities to transmit the instructions from Direction Centers to users such as CAA, FCDA, and various weapons units.

You can see that the heart of the SAGE project is the direction center building which houses the computer and the "black boxes" which feed information to it. A second major part of SAGE is the leased communications circuits which connect the rest of the air defense activities to the computer building. The third and much smaller part of the project is the equipment at the radar or other sites which convert the raw data into a form which the leased circuits can handle.

The equipment at each subsector for the most part will be housed in a concrete blockhouse building, which must all be especially constructed for this purpose. It will be windowless, must be air-conditioned for technical reasons, have special heat-dissipation equipment; besides, it must have special lighting and special dehumidifiers. Each blockhouse will cost about \$3½ million. In addition, each one must have an ancillary power building. The power building, however, will not have the technical requirements of the main building and will cost much less.



Radar equipped Air Force planes patrol hundreds of miles off shore.

Our biggest problem in SAGE, next to devising and testing the system itself, is the problem of successfully building, engineering, and installing the equipment. A basic requirement, of course, is that the finished product will have a high level of operational reliability.

There are several types of complex electronic equipment in SAGE. Three have already been mentioned: the computer, the radar converter, and the data link. There also is monitoring equipment which continuously checks on unattended radar miles and miles away to see that it is functioning properly. At the radar sites, special equipment will automatically transmit the converted radar data over telephone lines. And there are many other lesser equipments both at the radar site and at the control center. The coordination of these equipments is a major engineering feat.

The Air Force has been confronted with similar tasks in our aircraft and missile programs. As many of you already know, we have solved them by applying what we call weapons system management. This type of management uses a major contractor to coordinate and integrate the engineering and production details of the complete aircraft or missile. For example, we have used this method in the B-52 with Boeing as the systems contractor and in the F-102 with Convair. Now for the first time we are using the weapons systems approach to a major

ground supporting system. We have selected a weapons systems contractor for SAGE—that contractor is the Western Electric Company. However, it is really the total resources of the Bell System we are hiring for this purpose; Western Electric is merely the contracting agent, as is the case customarily in contracts involving the Bell System.

Now, using a weapons system contractor does not mean that other companies do not take part in the program. Actually, the major items of equipment, which dollar-wise represent the most significant portion of the SAGE system, are procured from several other manufacturers on prime Air Force contracts. In addition to this, many, many subcontractors share in the job of building equipment for SAGE. A good proportion of these subcontractors fall into the category of small business. In addition, the large task of erecting the specialized building for the computer will be contracted, in most cases with local construction companies under bidding procedures normally used for Air Force construction. From a purely financial point of view, it is wrong to assume that the weapons system contractor for SAGE gets a lion's share of the business. Specifically, for management services, the weapons system contractor will receive only a very minor percent of the total cost.

On the Air Force side, the SAGE project

is managed by a Joint Project Office—just as we do for aircraft projects. This office is set up in New York City and is the focal point for management of the task of building the SAGE direction centers. The Air Material Command exercises command control over this JPO—however, representatives of the Air Research and Development Command are full time members of the JPO staff. Other agencies having a vital interest in SAGE, such as CONAD and our Air Force installations representatives, are represented by full time liaison officers.

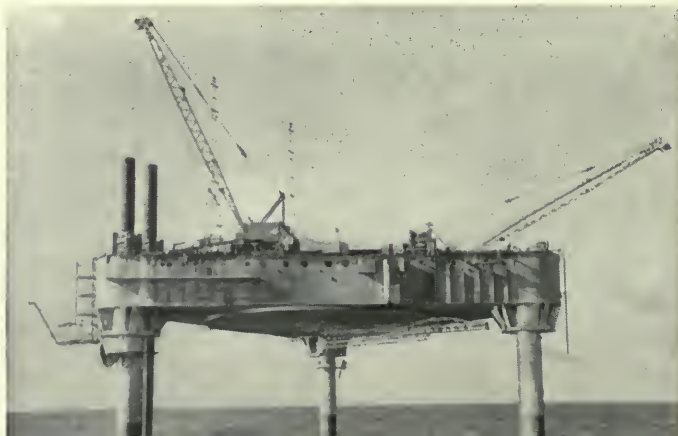
The management provided by our JPO is not just passive monitoring of the prime contractor's work. It is instead, a very active daily control of the salient points in the project. Our main purpose in using the weapons systems contractor is to help him provide the over-all integration needed in complex engineering jobs. However, we recognize the Air Force responsibility for insuring that our equipment procurements are operationally useful and obtained economically. So we provide the controls necessary for this in the JPO.

One aspect of SAGE is misunderstood frequently. Although we are leasing the communications circuits for SAGE—we are not leasing the other parts of SAGE. When the direction center building, with its computer and other equipment, are completed, they will be U. S. Government property.

LET ME EMPHASIZE, in closing, that SAGE actually is not a new air defense system. It is merely the modernizing of our existing system by introducing semi-automatic operation. This is accomplished by many electronic devices, by far the largest and most complex being the electronic computer. This computer is of such a nature that a special building with special atmospheric conditions is necessary for its adequate functioning. This building, including installed equipment, will be U. S. Government property. Over 600 separate communications lines must enter this building, tying it to many radar, to many other information sources, and to other control centers. These communications circuits will be leased from the appropriate franchise holder.

Constructing the SAGE system is one of the largest electronic ground systems we have ever attempted. The Air Force, in order to control it, has selected the weapon system type of management. This type of management has already proven successful in our aircraft and missile programs. This is the first time this type of management has been applied to a ground system. We are confident that this approach will give this country a reliable, major improvement in our air defense. And it will do it in the shortest possible time, at a minimum cost for quality workmanship.

Radar equipment mounted on a "Texas Tower" many miles at sea.



Its objectives: to help keep the public informed about the Bell System, maintain public good will toward companies and their employees, and sell our services and facilities

GETTING READY FOR THE NEW BELL SYSTEM TV PROGRAM

WILL WHITMORE

Advertising Manager, RADIO-TELEVISION-EXHIBITS, A. T. & T. CO.

Announcement has been made that the Bell System's television program will be available to TV viewers throughout the country when suitable network time can be obtained during evening hours, when the vast family audience is tuned in. The program, a weekly half-hour dramatic series, is now being filmed in Hollywood. The following article is a timely discussion not only of this new Bell System venture but of the System's important role in the television industry. EDITOR.

"WHEN IS THE BELL SYSTEM going into television?"

Is there a telephone man or woman who has neither asked nor been asked this question?

One way to answer it is to say that the Bell System has been in television since the very beginning. And the beginning? Turn back the pages of history to that fateful night of March 10, 1876. That was the night of the great transformation—a transformation that gave man a new power. That was the night seven words spoken by Alexander Graham Bell vibrated momentarily as sound waves and simultaneously were re-incarnated as electrical vibrations to travel over wires and to be transformed again into sound vibrations.

When Bell said "Mr. Watson, come here, I want you," the acoustic barrier to man's

words was shattered. His words could now travel on wings of electricity a few feet or many miles. The voice and ears of television had their beginning that night.

From that night on, telephone men worked and dreamed and found ways and means to better telephone service, and each step forward was a step toward television. By 1915, spoken words could span the continent. That same year, a telephone man sent his words winging not on wires but through the air from Arlington, Virginia, to the Eiffel tower. By 1922, the Bell System was operating the first commercial radio broadcasting station: WBAY, subsequently WEAJ. The following year, telephone men sent a radio program over telephone wires from New York to Boston—and network radio was born.

Other telephone men learned how to

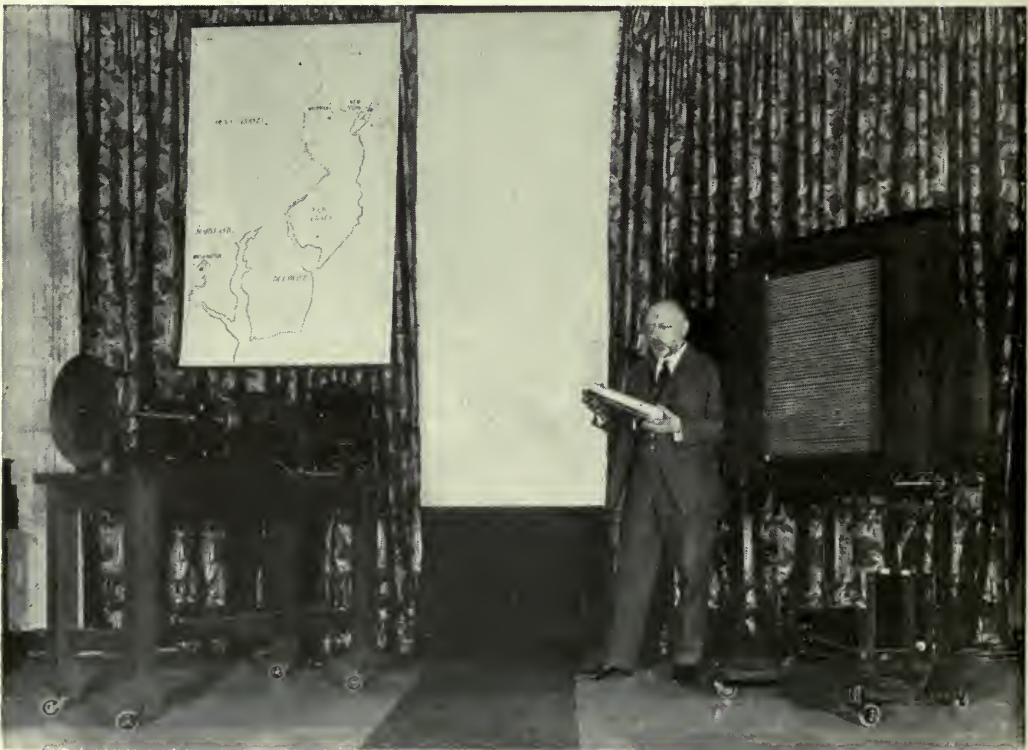
send pictures over wires and now man could both "see" and hear at a distance. Two telephone men, Maxfield and McKenzie, taught the world how to record and reproduce sound electrically. This knowledge gave birth in Bell Telephone Laboratories to another great development that brought television nearer: talking motion pictures. In 1927 the Laboratories were sending television images over wires and through the air. By June, 1929, the Laboratories added natural hues to these transmitted images—color TV! A year later they were sending two-way television images over telephone wires. You saw the called person and he saw you.

In 1938, telephone men held a public demonstration which gave promise to the one thing that would make television truly

nationwide. On November 9, 1938, they sent sound motion pictures over a coaxial cable from New York to Philadelphia. The war put a stop to further developments, but with war's end, things really began to happen.

By May of 1948, commercial network television was a reality, with twelve stations in five cities interconnected by 916 channel miles of television circuits. The year before, micro-wave television circuits had been put in operation. On September 4, 1951, network television spanned the continent.

To detail all of the accomplishments by telephone people that have resulted in television as we know it today would take far more words than are contained in this *MAGAZINE*. Today there are more than 70,-



The late Herbert E. Ives, of the Bell Telephone Laboratories, who was in charge of the first public demonstration of television, on April 7, 1927, is shown with apparatus used on that historic occasion.



Former President Harry S. Truman is shown in a Chicago monitoring set as the Bell System brought scenes from the Japanese peace conference on September 4, 1951, to the nation's television sets in a historic first transcontinental TV transmission.

ooo channel miles of television circuits criss-crossing the continent—about 51,000 of them adapted for color—bringing network television to about 400 stations in some 265 cities. The Bell System is truly *in* television; and its job of making network television available to almost every home in America is one of the most remarkable achievements in modern technology and business enterprise.

Dotting the hill-tops of the nation with micro-wave towers and extending the coaxial cables to cities and towns provided the telephone circuits over which network television programs could flow....thus giving to this nation the greatest medium of mass entertainment, information, education, and advertising it has ever known.

THE QUESTION IS ASKED, "When will the Bell System get into television?" It has been shown that it has been *in* from the very beginning to make network television possible. Perhaps you mean by your question, when will the System employ television as a medium of information and advertising? Here again the answer is the same. The system has been *in* television from the beginning. Bell System telephone companies began using this great new medium to inform their customers about the telephone business from the very first days of commercial television. More than half a dozen companies have or have had regular weekly programs, and all Bell companies now use television to inform or to sell.

In 1947, when television was still being



Just before the order "Action!" Showing how toll dialing works, as part of a "call by number" telephone company commercial.

called an infant industry, a half million people saw Bell System motion pictures on television. This television audience to Bell films sky-rocketed to more than 200 million for the first six months of 1955. During the same period, Bell System people stood before television cameras to deliver more than 200 talks, demonstrations, and news items to an audience of over 40 million home viewers.

In 1950 the Bell System sponsored a half-hour Christmas television program called "The Spirit of Christmas." Bell telephone companies have sponsored it every year since then. Each year, it has entranced millions of children, and grown-ups too. Its message of "peace on earth, good will toward men" has enhanced the good will which people everywhere hold for telephone men and women, as attested by the many letters which come to telephone companies each Christmas time. Here is a tele-

phone company program that has already become a Christmas television classic.

In the first six months of 1955, the associated companies placed and paid for more than 16,000 commercial messages on television stations. They were used to promote the use of the classified directory, to sell additional telephones in the home, to promote greater use of Long Distance, to indicate to Long Distance callers the advantages of calling by number, to show subscribers how to use the telephone more efficiently, and to strengthen their convictions regarding the high value and low cost of their telephone service.

Telephone companies today use television in almost every conceivable effective fashion to increase the public's knowledge about their operations. Closed-circuit television to permit citizens of a small town to witness a cut-over from manual to dial operation, television to educate the public

The New TV Program

on how to dial; television news on film furnished to TV stations to acquaint the public with new developments in telephony; television "spots" to sell color telephones as Christmas gifts. Whatever is new about telephone equipment, services, telephone people, or telephone research, you can be sure the public is hearing about it over their local television stations.

BUT YOU STILL ASK when the Bell System is going to get into television—and by that you mean, when is the System going to sponsor a regular network entertainment television program just as it has sponsored its own network radio program, The Telephone Hour, for more than 15 years?

That is a question that no one can answer as this is being written—but it may have been answered before you read this. The answer is imminent, and intriguing to telephone people. This much can be said. The Associated Companies are sponsoring a weekly half-hour television program; the program has been selected and is now in production on motion picture film; and you will see it on your own television screen in your own home just as soon as suitable time can be arranged for its showing on one of the networks.

What will this program be? Before that could be answered, much work had to be done and many decisions made. Finding the right television vehicle to carry the telephone story to a nation of telephone users has been no easy job. What kind of program would *you* select?

Of one thing perhaps all telephone men and women could be sure. The Bell System network television program, representing all of the Associated Companies and all of its people, must reflect the character and personality of the System.

It should be a welcome guest in anyone's home. It should be suitable for the eyes and ears of a child to see and hear. It must appeal to, rather than offend, the taste of that child's mother and father or his grandmother and grandfather. It should appeal to the young and old of both sexes; to the high school student and the college graduate. It must be a program of universal interest, because the telephone is of universal use and the program must deliver the telephone story to all those who use the telephone and to those few who don't.

Perhaps most important of all, the program must appeal to those who provide telephone service...the seven hundred and fifty thousand men and women of the Bell System. Any program worth considering should have a better than fair chance

Closed-circuit television is being used increasingly in business and industry. Here a teller in a branch bank is comparing a signature with the record in another office.



of being liked and enjoyed by them. They must be proud of it . . . proud enough not only to look at it but to have that proprietary feeling toward it which makes one want to talk about it to friends and neighbors.

This was a big order! In the Bell System there are more than 205,000 women under the age of 25. There are 486,000 men and women under 35, and 264,000 men and women over 35. There are 177,000 Pioneers—which means that they have had at least 21 years of service. Truly, if a program could be found that would receive the stamp of approval from these groups, that would be all that could be hoped for it.

As the search for the *right* program continued from almost the very beginning of television, more than 200 programs and program ideas were viewed and analyzed. This search, at times discouraging, was nevertheless fruitful. In July of 1955 it produced a program that seemed to meet the specifications. It was shown to the Associated Companies. They liked what they saw. Contracts were signed and cameras began to turn in Hollywood. A 40-minute film description of the program was shown to the

heads of the three television networks and they, too, liked the program, but by this time their program schedules for the fall and winter season were completed. There was no desirable time available. Perhaps that good time spot will bob up by the first of 1956; more likely in the spring, and most surely by next fall.

AND NOW, what kind of program will it be?

Well, when you were a child, didn't you ask, "Daddy, tell me a story." When you heard the story, didn't you then ask, "Was that a true story, daddy?" Do we ever reach the point of neither wanting to hear nor to tell a good story? Nothing is more popular than a story—unless it be a true story. And if the true story is a story of success, the story about how some man or woman, rich or poor, young or old, fought and overcame a handicap, or rose above obstacles, then that story will catch and hold an audience.

And so the Bell System television program will present stories in dramatic form . . . stories about real flesh and blood people, little known or famous, but people who through the triumph of their own hu-

Santa Claus fills Christmas stockings as the pater familias spies from behind a chair, in the Bell System classic "The Spirit of Christmas."



The New TV Program

man spirit rise for a moment or through a lifetime to something heroic and noble.

One story will be that of the stepmother of Abraham Lincoln, who fought for and earned the love of young Abe and his sister and perhaps gave first encouragement to him and sent him on to his destined glory.

Another will be the story of an humble junkman who rose to wealth and honor and a college degree at middle age.

There will be stories that are as modern as television itself, and others that reach back in time to tell of some little-known man who lived two hundred years ago but left his mark upon the world. Each story, whether new or old, will be told in terms of man's positive achievements rather than his defeats.

While each story will be told in dramatic form, with actors portraying the lives of the people about whom the story is told, one of the country's best story-tellers will introduce each story and narrate parts of it. He is John Nesbitt, long known in motion pictures and on radio and now making his television debut on this program.

Mr. Nesbitt is most widely known for his highly popular series of MGM motion picture "shorts," "The Passing Parade." These shorts consisted of 10-minute dramatizations of true stories. Between 1938 and 1948 about 70 of them were produced and shown in motion picture theatres throughout the United States, and many of them were translated into as many as six languages for use in Europe, Asia, and South America.

These "Passing Parade" shorts supply the best evidence of Nesbitt's unusual ability to combine high quality with great audience appeal. In five out of the ten years that the series was being produced, it won the Motion Picture Academy "Oscar" for the best short subject of the year. And in

three of those years it also won the Quigley Box Office Award for the "short" that drew the largest attendance.

Nesbitt was born in Victoria, B. C., in 1910. (He was naturalized as a United States citizen in 1950.) His father was Norman Hill Nesbitt, a British educator who later became a Unitarian minister. His mother, Elizabeth Nesbitt, was an American school teacher.

His family came to the United States while he was still a boy, and he was educated in Massachusetts and California schools and attended St. Mary's College in Moraga, California.

When his father died during the depression in the early 1930's, he went to work as a laborer in the California canning industry. However, his interest in dramatics and his excellent voice soon led him into radio. After wide experience as an announcer, writer, and director, he started his own radio program, also called "The Passing Parade." This program had a long and successful history before it was discontinued in 1946. Nesbitt lives at present in Carmel, California, with his wife, Priscilla, and their four children.

Production will be under the direction of Jerry Stagg, whose varied career has included experience as advertising writer, playwright, radio announcer, and producer of both TV programs and TV plays.

So there is the Bell System television program . . . a series of weekly half-hour dramatized true stories told on film and to be presented on one of the nation's television networks. The stories are being produced in Hollywood by the Hal Roach Studios, largest producer of television programs on film and noted for the quality of its work.

Will you and your friends and neighbors like the show? No one, of course, can an-



The cast of "The Stepmother," one of the stories in the television program the Bell System is planning to present to the nation. Ronnie Lee plays young Abe Lincoln and Rita Lynn appears as his stepmother.



Here are the junkman who achieved wealth and a college degree, and his two sons, in the story "The Golden Junkman."



"The Man with a Beard" and "The Joyful Lunatic" are two more stories which have already been filmed for the Bell System television program.



The New T V Program

swer this question until the program goes on the air and you have had an opportunity to judge for yourself.

It will not be a glittering "spectacular," but it is hoped that it will be human, honest, friendly and warm, and a welcome visitor each week in about seven million American homes. This is an honest appraisal of its character and potentialities.

It is an experiment and a year's trial should reveal not only whether the program is right for the Bell System but also much about the effectiveness of television as a medium of information and advertising for the telephone companies.

AND NOW, FINALLY, perhaps you have one more question: What does the Bell System hope to accomplish with this television program?

That is an important question, and the program's success will depend upon the way in which the question is answered.

The program will be expected to accomplish three things. It must help to keep the public informed about the Bell System. It must help to maintain the public's good will toward telephone companies and their employees. And finally, it must help in the job of selling our services and facilities.

A weekly half-hour program presented for one full year gives the sponsor just 156 minutes of "commercial" time. Considering the cost of television today, those are precious minutes. They must make plain, understandable, and appreciated the many mutual problems which exist and arise between the providers and the users of a service which contributes so much to our American way of life.

These minutes must depict the men and women who live and work in communities across the land to provide this service, and show how in their warm, courteous, and friendly manner they strive to make that service ever more valuable to the user through research, through better manufacturing methods, and through the daily operations of the telephone companies.

Some of these minutes must sell, and sell hard, the new and additional conveniences of modern telephone service in the home and office. They must "sell" mother and dad and sis and brother on the warm, human satisfaction in just a friendly telephone call to some one near and dear to them—across the street or across the nation.

Each of the "commercial" minutes, and the program itself, must contribute something toward maintaining and strengthening that public confidence which has helped so greatly to enable an aggressive and progressive telephone system and its people to provide the best possible telephone service at the lowest possible cost.

Is that too big an order? Remember, the telephone story is a big story . . . a many faceted, thrilling story of success, not unlike the stories to be delineated upon the entertainment portion of the show; but television, too, is big, and it has the power to convince and move people. When all members of a family enjoy together a television program, there is a unifying force at work which makes television's impact even stronger. When millions of families throughout the nation view a program simultaneously in all parts of the land, perhaps this same unifying force works to produce an impact the force of which no one has yet really measured.

TO SERVE WELL, WE MUST BE FINANCIALLY STRONG

JAMES W. COOK

Vice President, REVENUE REQUIREMENTS, A. T. & T. CO.

"WITHOUT HESITATION, the telephone men formed a human chain through the raging waters . . . Again the crew formed a line, this time in even deeper and faster water. To these men, rescuing seven persons was nothing exceptional."

I'm quoting from the previous issue of this MAGAZINE. The rescues mentioned took place last August near the telephone office at Putnam, Connecticut, during the flood emergency. In those critical days, telephone people were similarly helpful many times, in many places, and in many ways.

Over the years, telephone men and women have matched their technical skills in meeting emergencies with an unfailing willingness to undergo personal risks to help others in distress. Helpfulness is the heart of our spirit of service, and from newest recruit to president we take pardonable pride in the record.

There are many other important elements, of course, in any emergency restoration job. Plant and engineering appraisals of damage are promptly translated into requirements for men and materials. All

of us in the various departments work closely together—checking and cross-checking—to solve mutual problems. Individuals skills are reinforced by top-notch equipment. We carefully coördinate staff and field activities to achieve the best results, both for the immediate situation and for the long pull too. Finally, there is always the team drive which helps overcome even the most stubborn obstacles. The wrap-up expression is "Bell System resources."

WE TELEPHONE PEOPLE have heard this term applied many times to our prompt and effective action in coping with storms, floods, fires, earthquakes, and other disasters. To be sure, this capacity to rise to the occasion is what the public expects of us. But it's nice, too, to be appreciated. Newspapers write about it. Civic groups even pass votes of thanks.

Yet from where I sit, I see one factor among these resources which is hardly ever mentioned. And it is one of the most important. That is *financial strength*.

Let's think about it a minute.



In times of crisis, telephone men and women work long hours, willingly, doggedly, often wearily. They have a job to do and they do it.

Wire, cable, poles, batteries, and a thousand and one other items are needed in a hurry. At times, in huge quantities. They are on hand in supply houses and storage yards. Or they are manufactured in round-the-clock shifts and rushed by fastest means to the point of need.

You do almost anything to restore service in an emergency.

A helicopter flies plant men to an isolated community. A ninety-car train takes men and trucks from the mid-West to New England. Thousands of vehicles travel the highways to help get service back as quickly as possible. It all means food and housing for the men, gas and oil for the cars, materials galore to do the restoration job.

The major disasters of 1954 and 1955 did more than \$30,000,000 of telephone damage. All this destruction was caused by such mild sounding hurricane ladies as Carol, Edna, Hazel, Connie, and Diane, and by

floods. It's obvious that the shortness of the service interruption—the speedy return to normal—could only have been accomplished by telephone companies that are financially strong.

IT'S EASY TO DRAMATIZE what financial strength means during an emergency. But what it means from day to day, *all* the time, is even more important and far reaching.

For instance, it takes money to pay for research. Without it the telephone art would be in the horse and buggy stage. But with it, and largely because of it, the American people enjoy more and better communication services than any other nation. Customers, employees, and share owners all benefit from Bell System research.

The customer benefits from new and more valuable services—and also from efficiencies made possible by better methods of providing them. New inventions make the services continuously more useful. Economies put the telephone within reach of all.

Good jobs, better tools, and safer work-

ing conditions—these too result from good earnings. Only the prospering business can grow. And it's always the business that prospers and grows that offers the most opportunities for advancement.

The share owner, too, gains from the same improvements that benefit customers and employees. His investment in the business is more adequately protected as the System expands the range and usefulness of its services.

Good earnings permit the long range approach to the problems which vitally affect the best interests of all three groups. Providing plant is a case in point. Experience

has shown that it's good business to anticipate future requirements and provide for them in part in earlier installations. It takes some extra money at the time but, looking ahead, it's the wise thing to do.

We need the financial resources and security to plan and build most wisely for the future. Our business is growing rapidly and as we expand we are constantly building improvements and economies into the service.

Clearly, our basic strength lies in good earnings which are the product of adequate rates. Every one of us can help in making sure we keep that strength.

Research into future needs and desires of the American public is a big job, to which all units of the Bell System can make constructive contributions

LEARNING WHAT TELEPHONE SERVICE PEOPLE WILL NEED

JOHN M. SHAW

Assistant Vice President, MERCHANDISING DEPARTMENT, A. T. & T. CO.

"IT IS OUR DESIRE not only to keep abreast of the public's telephone needs at all times but also to anticipate those needs just as much as we can." So said President Cleo F. Craig to the A. T. & T. share owners at their annual meeting last Spring. A new Merchandising Department has been created to advise and assist in the job of meeting that desire.

Can we anticipate what the public expects of us with more assurance, and with more advance notice, than has hitherto been possible? The new department has been addressing itself to this question.

Many of the skills needed already exist among us. We have had long experience in forecasting community growth, and in expressing this growth in terms of physical requirements. Much has been learned about the forecasting of population and economic trends as a basis for planning the future. The theory of sampling has had many applications. Techniques for measuring public attitudes have made great advances since the war. Customer preference studies have been a part of our sci-

entific research work. The science of appraising markets for goods and services has also moved forward, and its methods are either well-known to telephone people or are readily available from outside sources.

Thus it is clear that what is commonly known as "market research" is not a new thing in Bell System operations. If we are to come closer to anticipating public needs, it would seem that renewed emphasis and coördination of existing skills will be more likely to provide the answer than any new or revolutionary program.

The Accounting Departments throughout the Bell System have assumed responsibility for the job of gathering together, at the request of other departments, all the pertinent market information that these skills and techniques can provide. They are strengthening their statistical divisions for this purpose. But research really begins when the facts are known. The interpretation of the facts so as to appraise correctly their significance to our objective constitutes a job that must be done by all departments.



"It is our desire not only to keep abreast of the public's telephone needs at all times but also to anticipate those needs just as much as we can," said President Cleo F. Craig to A. T. & T. share owners at last Spring's annual meeting.

Looking back ten years

A NECESSARY GUIDE for the future is the experience of the past.

When we came out of the war in 1945, the hope and expectation was that we would catch up in a year or two with the war-built backlog. Neither we nor anyone else could foresee ten years of uninterrupted and rapid growth.

What happened is eloquently told in a few simple statistics:

<i>Bell System</i>	1945	1954	% Increase
Telephone conversations (Billions)	29.9	52.7	76
Telephones (Millions)	22.4	43.3	93
Operating revenues (Billions)	\$1.9	\$4.8	153
Investment in plant (Billions)	\$5.7	\$14.1	147

This post-war record of growth is all the more remarkable when we reflect that it was achieved in spite of the difficulty of anticipating with assurance the future mar-

ket for our services. Nothing in our history offered a parallel to what happened after the war. Large and record-breaking as were our capital and construction programs, we still had not fully achieved the goal of giving the public what it wants when it wants it.

The first question that confronts those who are concerned with market research is therefore this: Are there signs and portents, based on our 1945-1955 experience, which will help us to anticipate what the public may want and need between now and 1965?

There are such signs and portents. And it becomes, therefore, the first job of market research to search them out and read them as carefully as possible. The statistical divisions of our Accounting Departments keep constant watch over population and economic trends and make the results of their studies available. It remains for all depart-



The experimental bedroom telephone is designed for attractiveness, lightness, and convenience.



This is a non-operating model of a bedroom telephone currently being market tested in aqua blue, rose pink, beige, and white.

ments, with the help of market research, to interpret these forecasts in the light of their own operations.

Looking ahead ten years

FOR THE BELL SYSTEM as a whole, here is what the statisticians tell us about the next decade:

<i>Bell System</i>	<i>1954</i>	<i>1965</i>	<i>% Increase</i>
Telephone conversations (Billions)	52.7	75	42
Telephones (Millions)	43.3	68	57

Expressing these increases in terms of revenues and investment is more complex because these are affected by technological and dollar-value trends that are more difficult to foresee. But that there will be substantial growth in these items seems inevitable.

In interpreting these forecasts, we must bear in mind that the statisticians base their future predictions on what is known of the past. We must also contemplate the effects of new services and methods, as well as the influence that aggressive promotion would have on the final result. This would mean increasing the 1965 estimate by some substantial but as yet unknown percentage. The application of market research techniques can give us a more complete picture of what the public will expect of us in ten years.

What are we measuring?

WHAT WE NEED TO MEASURE is the market for the use of a variety of communication services, local and nation-wide, with connection to the world outside. This is, after all, what we are selling.

In order to assure a high quality of service, it is necessary that we provide and maintain certain terminal facilities, chief among which are telephones and teletype-writers.

Important as is this equipment that the customer uses, the extent of it is ultimately dependent on the extent to which the customers want or need to use it. If we measure aright this need to use our services, we must then fit the facilities to that use. If we wish to expand the market, we must encourage existing uses and create new ones. The terminal facilities must be readily available, efficient, and pleasant to use—but always they are the means to the end and not the end in themselves.

Community market measurement

THE TELEPHONE NEEDS of the nation are the sum of the telephone needs of all its communities.

The telephone people who serve the local community are in best position to know the needs of the people who live there. They are in touch with its leaders in all walks of life. They know best in what directions the town is growing, what the plans are for new housing, and what industrial plants are expanding or being newly built.

Yet despite this local knowledge, the rapid growth of 1945-1955 has seen the capacity of many a newly-built central office exceeded early in its service life. Promotional programs have had to be curtailed so as not to sell party-line users more single-

The Telephone Service People Will Need

line service than our new buildings had lines for.

We have learned by such examples that behind the expressed demand of which our held orders for new and higher-grade service are so eloquent, there is an unexpressed demand that, having defied exact measurement, has not been fully reflected in the estimates on which construction of new central offices in many instances has been based. It is our hope that modern market research techniques can help us to come closer to the ideal situation where the capacity of our physical plant is at all times sufficient to the needs of the community yet not so far in excess of these needs as to be wastefully overbuilt.

We need also another kind of market

research aid that must come to the local management from outside. When one of our large industrial customers, in anticipation of a growing market for its products, lays its plans to spend a billion dollars in new factories, it does not at first know in what communities this investment will be made. Nor do Bell System people know in what communities we will be called upon to serve these new factories or assembly plants. But we do know that they will be somewhere and that they will increase the public need for telephone service. Anticipating public need is therefore not entirely a local community job, but the market knowledge of local management must be supplemented by that of people on headquarters staffs.



"The public greeted the introduction of color telephones with unexpected enthusiasm."

MARKET FOR ADDITIONAL SERVICE IN HOMES

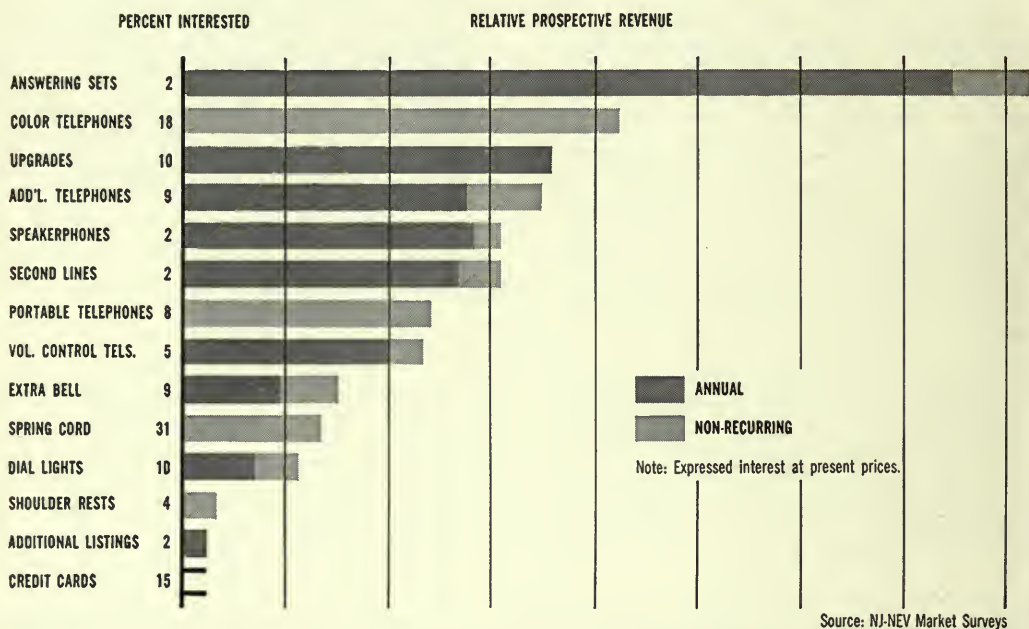


Chart No. 1.

The home telephone market

THERE IS CONSIDERABLE EVIDENCE pointing to a market for home telephone service beyond that reflected in the statistical estimate. In 1945, only 47 per cent of American homes had telephones, and this has increased to 72 per cent at the present time. Of these telephone homes, some 14 per cent have two telephones and a minute percentage have three or more. The statisticians estimate that about 83 per cent of the homes will have telephones in 1965—about 62 million home telephones in all.

Market studies made during 1955 in New Jersey and Nevada help us to anticipate the public need for fifteen home telephone services now offered.* Since the results in these widely separated and diverse territories correlate quite closely, it is not unreasonable to assume that they may be

roughly representative of the nation-wide market that awaits development.

Effect of color on the home telephone market

THE PUBLIC GREETED the introduction of color telephones with such unexpected enthusiasm that it was decided to conduct a nation-wide market study to determine what colors would prove most acceptable and to what extent the customers would want them at current prices. This entailed visits to 6,000 homes in 75 cities, so selected that they would be representative of the more than 27 million homes served by the Bell System. By expanding the results on a Bell System basis we find that there is a ready market for about ten million color telephones. Further application of these same techniques can enable the companies to anticipate public demand so as to keep

* See Chart 1, above.

The Telephone Service People Will Need

supplies and promotional activities in better balance than is otherwise possible.

The study has also given us precise information about the living spaces where telephones are now chiefly located in the homes of America. It is quite clear also that color taste goes by rooms: light pastel shades in the bedroom, grays and greens in the living room, whites, reds and yellows in the kitchen. Should the time come that there are more telephones in bedrooms than in living rooms, the leader would presumably be rose pink. Our color requirements would change accordingly.

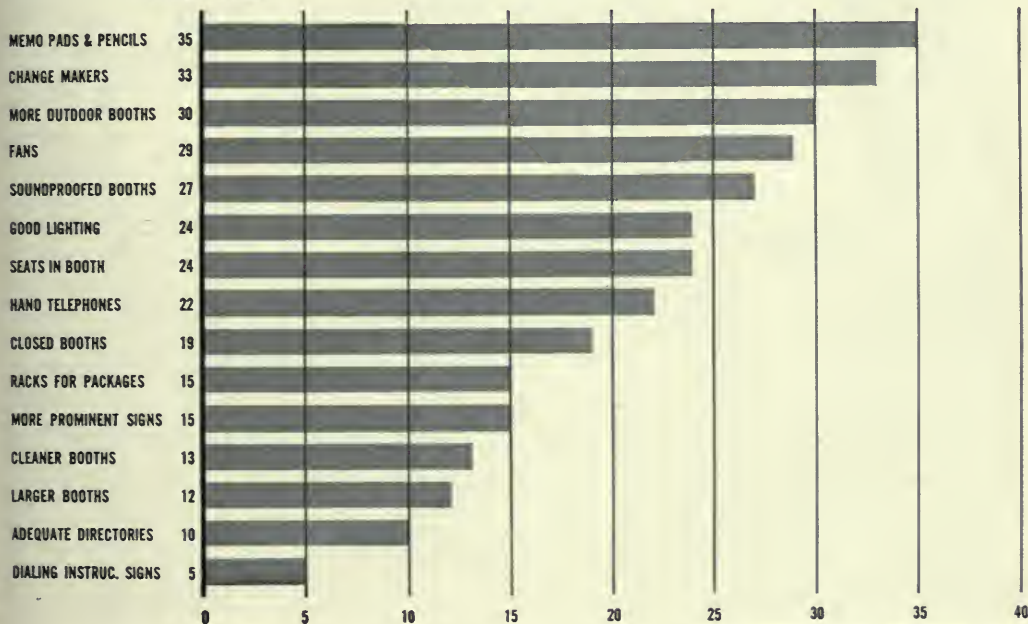
This may very well be the situation long before 1965 is reached. Not only are there more than 70 million bedrooms in homes served by the Bell System, but there is now under consideration a telephone especially styled for bedroom use with particular thought to its aesthetic appeal. Non-oper-

ating models of this entirely new telephone, shown on pages 249 and 250, will be made up in the preferred bedroom colors and market-tested by the same method used in the nation-wide color study.

What our study of the home market so far tells us is that the American public is ready to accept a new concept of home telephone service. It used to be that one standard black telephone centrally located and listed in the directory was all that was needed. That is no longer true. The home of the future will have telephones in all its principal living spaces, and these telephones will be styled to the needs and colored to the taste of its occupants. It remains for the Bell System to so direct its market research, design, manufacturing, advertising, selling and installation programs that we shall be in advance of this trend, guiding it. We shall do that, of

IMPROVEMENTS WANTED IN PUBLIC TELEPHONE SERVICE

PERCENT WANTING



Source: Columbus—East Bay Public Telephone Surveys

Chart No. 2.

course. Otherwise we shall be behind it, for the trend seems inevitable.

The business market

TO ANTICIPATE AND KEEP ABREAST of the needs of our business market is a much more complicated process than to do the same for the home market. Yet the basic problems and the approach to them are quite similar.

Communications needs vary in accordance with the nature of a business, making it desirable to study separately each of a considerable number of business categories. Recognizing this, the Commercial Department of A. T. & T. has suggested that each associated company select for specific study one or more business categories that might be of especial importance in its territory.

The first of these studies is under way. Its purpose will be to examine into the needs of the downtown department stores and their suburban branches, as they are now and as they are likely to be in the future. The operations of each department of the modern retail store will be studied to see where our existing services might be applied to serve it better or what further services we should develop. The requirements of manufacturers and distributors who are in constant communication with the store will not be overlooked. The study will include market research to find out as much as possible about the telephone's place in the shopping habits of the city dwellers and suburbanities. The entire project is one of interdepartmental coöperation, supported by outside professional help as mentioned in the introduction of this article.



Closed-circuit color television introduced the first "flowers-by-telephone" sales meeting among the nation's florists, which the telephone companies developed last Fall.

The Telephone Service People Will Need



This telephone is in the granary of an Iowa farm—one of a group of farms on which the value of more complete telephone service is being demonstrated and the need tested.

When the study is completed, it is hoped that it will provide basic information that will be helpful in every Bell System city where similar conditions prevail. It should serve also as a useful and practical guide to the Engineering and other departments of A. T. & T. and to the Bell Telephone Laboratories in determining future technical research and development programs.

A study of similar nature is being considered for the railroad field. The telephone companies are working to provide America's railroad systems with communications that are in keeping with the railroads' own ideas about up-to-date service, supplemented by our knowledge of what lies ahead in the way of technical advancement. This means study not only of the rail-

roads' own operations as they touch on communications; it means also an examination into the viewpoints and habits of the shippers and passengers who communicate with the railroads.

It is expected that market research of like scope will shortly be under way in the airline and trucking industries. While these have elements that resemble those of the railroads, they have their own distinctive elements too, and each must be examined with an understanding knowledge of its operations as they are affected by communications.

A ready measure of the importance of the railroads as a market for the use of the Bell System services is, as in the case of the department stores, the revenues that come



A need being met: A built-in light illuminates the dial of this telephone whenever the handset is lifted.

to us annually from this source, and those that they influence by the very fact of their operations. Apply the same reasoning to the hotels, the banks, the large manufacturing industries, and a score of other categories of large customers, and the scope of the market research job that remains ahead of us in the business field becomes apparent.

THERE IS ANOTHER IMPORTANT AREA of industry that it has been our custom to refer to as "the small business market." This includes the retail shops and services that we find in every residential neighborhood—the grocers, the laundries, the hardware stores, the drugstores. While composed of small individual units, these not only group themselves into large categories, but in this modern age we find them organized into territorial and national chain systems that rival in size many of those enterprises called "big business."

The communications needs of the neighborhood grocer differ from those of the florist next door. Yet they are quite similar to those of all other grocers, whether in Portland, Maine, or in Portland, Oregon.

Telephone market research will therefore direct itself to each of these giant categories. In the case of the grocer, it follows the chain of food distribution from the factory—yes, even from the field and the orchard—to the wholesale distributor, to the corner store, to the customer who places the order from her kitchen telephone. We must keep our communications services geared to the needs of each of these links in the chain of distribution, promoting their use and thus speeding up the process of food distribution.

The modern supermarket has grown at a rapid rate during the very years when home telephone service has become well-nigh universal, and almost every variety of food has been so packaged that little is to be gained by seeing it before it is bought. All the modern housewife has to do is to sit by her telephone, dial a number, give her order, and go about her business until her groceries are delivered. But instead, she takes an hour or more out of her busy day, drives a 200-horse-power automobile a mile or more in the rain through busy traffic, finds a parking space, walks to the store, pushes a small carriage up and down the crowded aisles, selects gaily colored packages from the shelves, stands in line at the cash counter, carries her purchases to the car, drives home, and deposits her bundles in her telephone-equipped kitchen.

Market research in this field would put a measure on the extent of this merchandising opportunity, and on the telephone usage that we stand to stimulate by promoting our service as a fast and economical

The Telephone Service People Will Need

final link in the communications chain that brings food from field to kitchen.

The neighborhood florist is a member of a business fraternity so big that we have estimated that our current "flowers by telephone" promotion can mean \$6,000,000 a year in long distance revenue. Yet this is only part of the telephone's potential use in the distribution of flowers from the nursery to the table.

In each of these business enterprises, and in all others that are parts of America's great and growing distribution system, market research is needed to help us keep abreast of the communications needs of these customers, and to continuously direct our program of laboratory development in accordance with these needs.

Besides these studies directed to measuring public need in home and business, we need to examine certain broad areas of telephone service in which market research projects have already been started or are being considered by various companies. A brief description of three of these is all that is possible in the brief compass of this article.

Public telephone service

THE PUBLIC TELEPHONE, which in years gone by was "the poor man's telephone," is now every man's telephone while he is away from home. More than six per cent of all Bell System revenues come through this channel.

Improvements in the appointments, appearance, and location of public telephones since the war have taught us that the public rewards such attentions to its comfort by ever-greater use of these facilities. Outdoor booths in city after city have brought in more revenue than the nearby indoor booths without lessening the latter's revenue. When booths in the New York

subways were brightly painted, their use increased substantially.

Such results naturally lead us to ask what other improvements might be made. Surveys of public needs and desires conducted in various states gave us a partial answer, as shown in Chart 2, on page 253.

These studies covered the field of public telephones over wide areas. We know, however, that each of the improvements, and perhaps others, has greater significance in some locations than in others. We need to examine these needs more intensely, and by types of location—the railroad terminal, the drugstore, the gasoline service station.

Information services

THERE IS A VERY GREAT but as yet unmeasured desire for services which enable large numbers of people to make regular calls to common numbers for the kind of infor-



Talking "no hands." This gentleman is conversing through the speakerphone—which can also be used in the customary fashion.

mation that can be magnetically recorded on a repetitive basis.

Time service is now provided in this way in many Bell System cities, and millions of calls are made daily just to find out the correct time. A brief weather report is similarly provided in twelve metropolitan areas and 85,000 people call for it every day in New York alone.

Since what we are selling is the use of a communications system, we will strive for the expansion of these services until they are available wherever they can be economically provided so that their use becomes in time a universal habit.

There have been numerous requests for information services of a similar nature—stock exchange quotations, news reports, sports results, daily menus, and a host of others. Some of these requests it has been possible to meet, particularly since we have been in position to install recording-answering equipment on customer premises. In some cases these services have stimulated so much traffic as to overtax the capacity of our central offices.

Market research is needed to determine the extent of the desire for each of these services, not only to help us determine whether they should be provided, but also to serve as a guide to the Laboratories, where the instrumentalities are developed.

Telephone number availability

NO TELEPHONE CALL can be made without a number. If our objective is to expand the use of our service, we will therefore do everything possible to make telephone numbers readily available to the users.

The graphic arts have not improved

rapidly enough to keep pace with the physical expansion in listing information as the number of telephones has increased. Directories have consequently grown larger and more cumbersome, and it has been necessary to split them apart to serve smaller areas at the very time that the dialing range is expanded. Meantime, inviting advances have been made in microfilm, magnetic recording, television, and other allied fields that provide a glimmer of hope for a future method of number dissemination that would supplement the time-honored method of printing in black ink on white paper.

Studies are under way in the Laboratories looking to new methods of providing number information. As a guide to those studies, we need to know as much as possible about the habits of the telephone users in the finding and recording of telephone numbers. Market research, in this as in other ways, should keep pace with applied research in the physical sciences.

IN THE SPACE OF a brief article of this nature, it is possible only to touch the high spots of so comprehensive an undertaking as the anticipating of the needs and desires of the American people for communications service.

It is a big job. But it is one that will be done because each operating unit in the Bell System is undertaking that part of the job which it is best equipped to do. The skills are already in the telephone organization or can be availed of on the outside. Since the will to do it is also there, it is merely a matter of time until we are in position to anticipate fully and keep abreast of the public's telephone needs at all times.

*Minutes of the National Telephone Exchange Association
for 1880-1890, in the A. T. & T. Historical Library,
disclose hopes and problems of the Founding Fathers*

CONFERENCES ARE AN OLD BELL SYSTEM CUSTOM

RALPH E. MOONEY

Historical Librarian, A. T. & T. CO.

WE DID NOT originate business conferences. As an institution, they probably were begun by the earliest traders along the shores of the Mediterranean or the China Sea. Nevertheless, most of us feel that Bell conferences have a special quality, and possibly we are right. It does seem that national and local, departmental and inter-departmental gatherings have a more important place with us than in many other industries. They figure largely in our management and training programs, and in the merchandising of our end product, telephone service.

Perhaps this is because the value of conferences became apparent early in our history. For "system-wide" meetings were being held when the Bell System itself was more a conjecture than a fact. They took place under the auspices of an organization named "National Telephone Exchange Association," which held twelve meetings at intervals during the years 1880-1890 inclusive. Printed transcripts of the proceedings at each meeting survive today in the A. T. & T. Historical Library. By direct statement and between the lines they

afford a valuable record of the development of telephone service throughout those early years.

Alexander Graham Bell got his first patent on March 7, 1876, when his telephone would transmit speech sounds but rarely words. On March 10, it transmitted the oft-quoted sentence, "Mr. Watson, come here, I want you!" In 1877, Bell took out his second basic patent, and his assistant, Thomas A. Watson, began to develop commercial telephones. Beginning in April, these were rented for private line use, and in many cities agents were licensed to promote telephone usage as best they could. By October between two and three thousand telephones had been rented.

In 1878 came the first telephone exchanges, and with them the first efforts at competition in our business. Growth and competition filled the latter part of 1878 and eleven months of 1879. Then it became apparent that no other means of transmitting the voice had been developed that would not infringe upon the Bell patents. Competition ceased for a time, and the founders and licensees of Bell telephones



Morris F. Tyler when he was president of the Southern New England Telephone Company.

had before them the task of consolidating the infant local and long distance services that had shared in the struggle to get started. And nine to ten months later, September 9 and 10, 1880, the first "national convention of telephone companies" met at Niagara Falls to organize the National Telephone Exchange Association.

Enthusiastic Uncertainty

TO GET a general impression of the work of the Association during its early years, it seems worth while to move ahead to September 1885, when Morris F. Tyler, president of the Southern New England Telephone Company, was stepping down after serving two years as president of the Association. In a valedictory speech, he undertook to review telephone affairs from the beginning.

"I remember very well," he said, "when we came together in 1880, all strangers to one another. I don't think there were three

men in that gathering that I had ever seen before except the American Bell agents. We were all in a state of enthusiastic uncertainty."

Elaborating this, Tyler went on to assert that no one at the first meeting in 1880 could say his exchange was making money and back the statement with figures. No one even could say he expected to make money and offer figures to support his estimate. A year later, there was a more definite basis for optimism. Two major threats in patent litigation had been decided in favor of Bell, and business generally was good. Therefore, in the years 1881-1882: "I think I saw the most self-contented men . . . that ever came together in one room."

Complacency, then as now, could not long endure. The meetings of 1883 and 1884 were much less cheerful, for the country was in the grip of a depression. Finally, 1885 found things on the mend, but Tyler warned: "We have reached the period of steady work, of constant anxiety, of careful forecastings not only of tomorrow, but of next year."

Suggestions, Not Commands

ANOTHER QUOTATION from the 1885 meeting is in order here. During a discussion as to whether the Association should go on record as favoring one of three proposed gauge scales for wire, someone asked if such an action would bind all members to use the scale selected. Charles N. Fay, of the Chicago Telephone Company, one of the ablest of early telephone operating men, said: "When that question first arose, it was generally accepted that the intent of the Association was to exercise influence rather than to pass binding laws."

The enthusiastic uncertainty of the 1880 meeting is indicated in the rather limited discussion of methods and materials that

Conferences Were an Early Development

took place. The merits of galvanized as compared with plain iron wire were set forth. Lead-covered cable was mentioned, but except where a few under-river crossings were being tried, the only cables in use were not much more than a city block long, so the subject did not merit real discussion. Someone said, in passing, that occasional industries might want to operate their own switchboards, but what was envisioned was a private communication system, not a PBX connected to an exchange. Also it was taken as a matter of course that exchanges would maintain messenger services and that these might be used on contract to distribute circulars and do other non-telephonic work.

Rates, as you might expect, were a matter of moment, and all agreed that the flat charge with which service had been launched had its disadvantages; that some way should be found to get subscribers to pay in proportion as they used the service.

True Conference Pioneers

GEORGE F. DURANT, GENERAL MANAGER for the Bell Telephone Company of Missouri, was the first Bell System conferee—or at any rate the first on record—to say: “I didn’t mean for us to take action now. I just threw out the idea as a suggestion to the convention.” Sydney C. Lumbard, of the Fort Wayne, Indiana, Telephone Exchange was first to voice a common complaint. When it came time for him to talk—toward the close of a rather limited agenda, at that—he announced that previous speakers had covered everything he meant to say.

The first meeting was notable for one statement of “parent company” policy. This came up when members urged that local exchanges be permitted to take action against infringers of the Bell patent in their territories. O. E. Madden, superintendent



Charles Norman Fay, who represented the Chicago Telephone Company.

of agencies for the American Bell Company, quickly pointed out that for local companies to undertake this would result in an endless confusion of legal actions and decisions.

The Association held two meetings the second year, 1881, and at the first of these we find John I. Sabin, of the Pacific Bell Telephone Company, noting with some surprise that as subscribers to his exchange doubled in number, his plant had to be doubled in size. A few discussions taken at random from meetings that year and the next will make clear some of the growth pains and pangs of the telephone art.

The Whisper Test

ALTHOUGH EACH MEMBER of the Association had plenty of problems in maintaining local service, all were interested in extending their lines. Therefore the question of how to get the best results over long lines

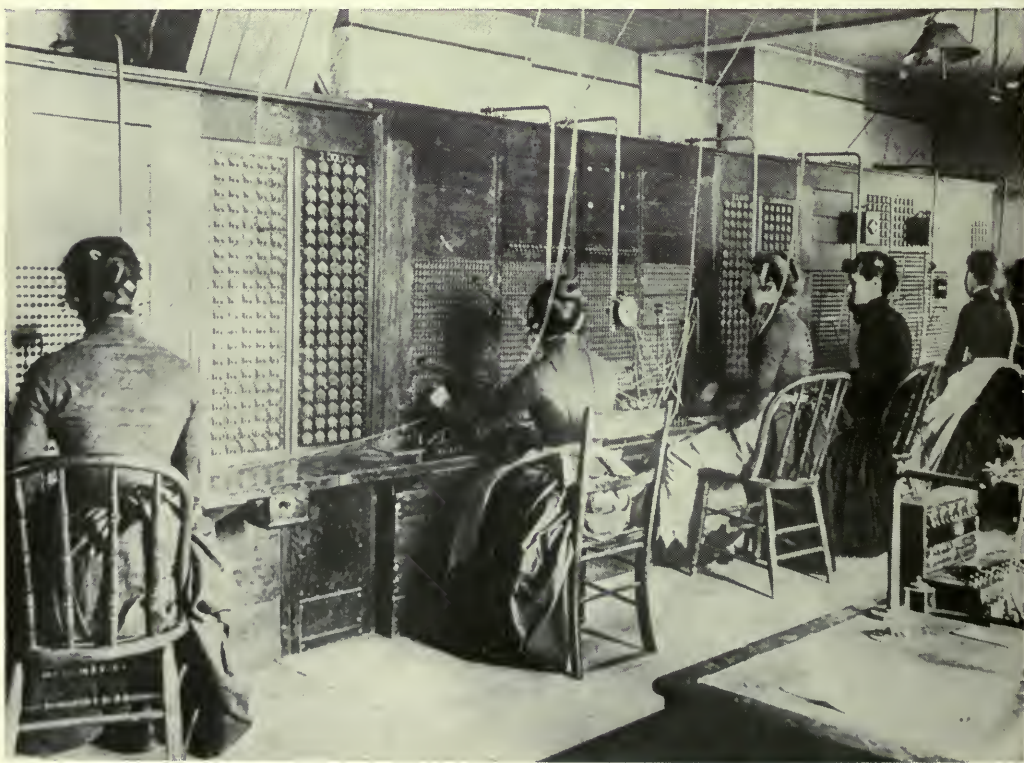
agitated them in 1881 and 1882. And one question, incredible as it may seem today, was debated at several meetings: was insulation worth the trouble and expense it caused? And by insulation was meant, not the use of insulated wire on open lines, but the installation of glass or other type of insulators and tying the wires to them. Some maintained this was wasted effort.

E. S. Babcock, Jr., of Evansville, Indiana, said, for instance: "I don't know anything about electricity and don't want to know. I have four hundred miles up that way [with and without insulators on the same poles] and you cannot distinguish an insulated from an uninsulated wire; if you listen, you cannot tell on which one is the talking."

To this, W. H. Eckert, of New York, who had been advocating use of insulators, plus a device he described as a lightning arrester and induction killer, answered: "I think we can work about two hundred miles, and to Hamilton you can whisper any time during the day."

Babcock retorted: "We have whispered a distance of twenty miles with no insulators on at all."

One reason for this early doubt of the value of insulators was the enthusiastic uncertainty that existed as to how they should be made and installed. Some were placed on top of cross arms or brackets as they are today; others hung underneath. Some were simple porcelain knobs with no provision for a dry space to prevent electrons escaping over the surface during rain or



An early multiple switchboard.

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fog. Former telegraphers who had switched over to the telephone business understood the principles of good line construction, but since many kinds of troubles interfered with telephone talk, there was so much room for doubt that a man who didn't want to know anything about electricity could still argue from the results he got under good weather or otherwise exceptional conditions.

The Carbon Button

TELEPHONE TRANSMITTERS have been so good for such a long while that few people are aware they had to pass through the period of evolution common to all human devices. Bell's first transmitter worked on the principle of moving a metal armature over the poles of an electromagnet. Edison, Berliner, and Blake all contributed to working out a design that transmitted talk by varying the pressure on a piece of carbon—a carbon button. Later it was discovered that the best results were obtained with granulated carbon—grains of anthracite coal, to be exact—but in the early '80's the carbon button represented the best component to be found. And so we find one member of the Association (not otherwise identified in the transcript) saying:

"I discovered a few days ago that by reversing the battery on one of my transmitters, it worked much better. It may be that a sharp point forms on the diaphragm or spring, which by turning the current in the other direction is removed."

Commenting on this, W. D. Sargent, of Philadelphia, said that in his exchange the difficulty was "a sort of booming sound which our inspectors attribute to the springs, which are softer than in former transmitters. And we have demonstrated that is so by taking out the new springs



George F. Durant, who was general manager of the Bell Telephone Company of Missouri until 1909.

and replacing them with springs out of damaged transmitters."

C. E. Chinnock, of the Metropolitan Company in New York City, then said: "I notice that the carbon as it comes from the factory has a very fine dust on it. All these fine particles make for the point of contact and fuse there. If this carbon is taken out and polished on another piece of carbon, the trouble will entirely disappear."

Early Wire Lines

ANYONE FAMILIAR with the terminology used by American advertisers and cataloguers until long after the beginning of this century will enjoy a reminiscent smile over W. A. Jackson, mainstay of telephone service in Detroit, telling the 1882 meeting to be sure to use wire of either the "Best Best" or "Extra Best Best" grades.

Soon after Jackson spoke on that occa-



Outside plant on lower Broadway, New York, in the early 1880s.

sion, a committee brought in a recommendation for reducing electrical disturbances on telephone lines, as follows: "With a well-insulated, joint-soldered line of non-magnetic material a degree of perfection may be attained that will leave but little to be desired." Which elicited comment from T. D. Lockwood, electrical and patent expert for the American Bell Company: "I think that a most excellent suggestion, but I do not see the way clear for us to get such metal, because it is one of the most important features about electricity that when any conductor, iron, steel or phosphor bronze, is traversed by an electric current, it becomes magnetic."

We should bear in mind that telephone wire at this time meant telephone line—for the lines were nearly all single-wires. This was standard telegraph construction and few telephone men had considered any other method. But the value of circuits using two wires, such as are common today, was known and even in this year of 1882 we find C. N. Fay saying: "I have been

so satisfied with the necessity of using a metallic (or two-wire) circuit eventually that we are now buying cables to replace the present aerial house-top lines within what we call the business district of the city of Chicago, comprising from fifteen to seventeen hundred of our exchange subscribers." (Elsewhere in Fay's report, Chicago subscribers were reported as 2,596 total that year).

The size of wire, particularly on long lines, was a matter for debate. Fay in 1883 was for thick, low-resistance copper wire, but others held out for smaller gauge wire. This controversy was well summed up by A. S. Hibbard, then superintendent of the Wisconsin Telephone Company, in a paper read at an 1885 meeting.

Induction And Long Distance

"OUR FIRST IDEAS about long distance were too sanguine," Hibbard reported, "but it is now generally profitable and flourishing over distances around 100 miles." He went on to describe the toll-ticket plan for build-

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ing longer lines. Books of tickets, each good for so many calls over the projected line, were sold to potential users, to help defray the construction cost. The plan was effective in building much of the early long distance network.

"Soon after construction," Hibbard went on, "came reports of mysterious noises heard in the telephone. At one end of the country the croaking of bullfrogs and singing of birds made serious disturbances, while in another locality it was held that the interferences were caused by the sighing and moaning of the wind. After a while the term *frying-pan noises* was adopted. By whatever name, these still remain the most perplexing feature of long-line work."

In dry, cold weather, the lines were practically free of the noises, but in warm, damp weather the sounds often could blot out conversation just as static can override AM radio programs today. But static to members of the Association was just the name for one kind of electricity. No one

suspected it of affecting telephone lines and few were aware of the witchery of condensed water vapor for creating ghostly effects.

"It is almost impossible," reported Hibbard, "to obtain any definite information in regard to these troubles or their remedies. It has been remarked that the laws of inductive disturbance are not similar in any two states."

Another surprise in long-line work, he said, was that when two wires were strung on one line of poles, the inductive effect from one to the other was so great as to make it impossible to talk on both at once. "As yet, no satisfactory remedy for the trouble has been found. It is thought, however, that a minimum effect in cross-talk is obtained where one line is attached to glasses, well insulated, and the other attached to a bare pin or bracket. Opinions differ on this."

Hibbard then quoted a speaker at an earlier meeting of the Association as say-



A social outing of the National Telephone Exchange Association.

ing, "It has been proven conclusively that the best wire for long lines is that of the smallest diameter and of lowest resistance." He went on, presumably with a chuckle, to say, "Soon after that conclusion was reached, hard-drawn copper wire was perfected and introduced. The best results which have been obtained in long distance have been over this hard-drawn copper wire of large diameter."

The Question of Cable

AS EACH MEETING CONVENED, the question of cable became of more importance. Cable was not a telephone invention. Sir Charles Wheatstone had patented a cable for telegraph lines in 1860. The telephone companies, as they required it, at first tried telegraph cable, but immediately had to begin experimenting with various kinds of insulation inside the sheath to prevent crosstalk and induction. The best insulation and sheathing were not developed until the

early 90's, after the Telephone Exchange Association had ceased to be, but the development was based on the experimenting and reports of Association members.

It may be of interest to remark that T. D. Lockwood, in 1882, described a Western Electric cable that appears to be a forerunner of the pre-lashed cable that company is supplying today. Lockwood said: "The cables are provided outside the lead tubing with a pair of stout iron wires which are twisted in a long spiral around the tube and bound to it by a smaller wire. The two stout wires are attached to all necessary supports."

Final Meeting

AVAILABLE RECORDS do not make clear just when it was decided to abandon the Telephone Exchange Association. But the reports of the final meetings furnish evidence that it had served its purpose. It had been a tremendous help in getting the telephone



John I. Sabin, of the Pacific Bell Telephone Company, and Edward J. Hall, of A. T. & T., were important figures in the telephone's second decade.

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service launched and on its feet. The kind of reports furnished at the final meeting, in September, 1890, indicate that future development would be through departmental work and that future conferences, to be effective, should be confined in the main to departmental groups.

At that last meeting, for instance, E. J. Hall, Jr., who had graduated from management of the Buffalo exchange to a System position, and J. J. Carty, who was in process of taking the same step upward, displayed charts of departmental organizations, and reported on the desirability of defining authority for department heads. In addition, Carty reported on his bridging bells, which cut the bell magnets out of talking circuits to improve party-line service. George Davison, of Brooklyn, reported on the operation of a switchboard recently changed over from single-wire to metallic circuit operation. W. R. Patterson, who figured largely in developing the process

for applying the lead sheath to cables, reported on the housing and care of central office apparatus. F. A. Pickernell, before long to be chief engineer of the A. T. & T. Co., reported on exchange construction and equipment.

Several companies had dropped out of the Association by that time, so that not all reported their figures for the last meeting, but those reporting listed 71,220 subscribers in 24 companies, serving 47 exchanges. Boston then reported 3,767 subscribers; Cleveland, 2,613; Hartford, 745; Louisville, 2,183; New York, 8,224; Philadelphia, 2,901; Pittsburgh, 3,433; Providence, 2,166; Washington, 1,600. Springfield, Illinois, had the highest telephone development, one telephone to every 41 inhabitants. The westernmost exchanges reporting were Omaha (1,513 telephones: 134,000 population) and San Antonio (515 telephones, 40,000 population).

Daily calls per subscriber were reported.



Angus Hibbard—seated at right—with the original drawing of the Blue Bell, which he designed.



Charles H. Haskins, who was first president of the Milwaukee and the Wisconsin telephone companies.

Richmond was high with 17.1; Peoria next with 14.7; Toledo next with 13.2 and Hartford was low with an average of 4 per day. Peoria was high in the number of connections per operator per day average, with 1,340. Trunk toll lines out of East Saginaw were averaging 89 connections a day; those out of Richmond but 5.

Valedictory

WILLIAM D. SARGENT, of Brooklyn, was the last president of the Association. In a

speech in 1890, he summed up the work of the organization—and the growth of telephony—although he gives no evidence that he was aware it was to be the final summing up for that group:

“Ten years ago, how crude the business was! The multiple switchboard was a mere idea. Cables were only hinted at. Use of iron or steel wires was almost universal. Insulation was considered of little account by many, and some declared insulators superfluous.

“The standard today requires the use of copper for conductors, overhead as well as underground, and substitution of metallic circuits for single grounded wires. The underground wires and cables of five years ago do not answer the requirements of today and the same may be said of central office and substation equipments.”

And a little later, during that final meeting, we find E. J. Hall, Jr., remarking an improvement in relations between corporations in general and the public. “This change is due to better understanding [by corporate managers] of the obligations which rest on them to so organize their forces that the public shall be efficiently served, stockholders receive proper returns, and last but by no means least, that employees shall be justly compensated and fairly treated.” Which, in the light of our present understanding, seems to be about the earliest expression on record of Bell System policy as we know it today.

A central office in a small city in the 1880s.



*How Western Electric helped produce the ADams 3 and 4
Central Office in Belleville is in essence the story of
Western's part in central office projects of all kinds*

CREATION OF A CENTRAL OFFICE: A CASE HISTORY

GEORGE B. TURRELL JR.

Feature Editor, WE MAGAZINE, WESTERN ELECTRIC COMPANY

AT EXACTLY 1:01 A.M. Central Standard Time on Sunday, October 2, 1955, the "ADams 3 and 4" dial central office was cut into service in a new telephone building in Belleville, Illinois, a community of about 30,000 situated 20 miles southeast of St. Louis, Missouri.

The cut-over itself was routine—just as everyone really expected it to be. The tension in the knot of telephone engineers gathered around the trouble recorder dissolved as the blocking tools were pulled and the new equipment came to life. Reassured by the satisfying "clickety click" of switches and the absence of "trouble tickets," the group broke up with relaxed grins.

In a few minutes the operators who had been on duty in the old manual office across the street came into the new building, headsets in hand, to take their positions on the new toll and D.S.A. board. "The board over there really lighted up a little while before you cut," a service assistant said. "We thought you had changed your mind." As the Southwestern Bell and Western

Electric people who attended the cut-over went home in the early morning darkness, they looked up briefly and saw that the old manual office was dark for the first time in 43 years.

Though it happened, as is customary, at a time when most people were asleep and traffic was thus at its lowest ebb, the cut-over of the ADams office was an event of some note in Belleville. Mayor Calhoun made the first call—by Direct Distance Dialing—to the Mayor of Kansas City. The *Daily Advocate* ran a front page story proudly proclaiming the "new \$3,200,000 dial center" to be the "most modern of its kind in the area." Evidence of public interest, spurred by the novelty of dialing, manifested itself in the soaring traffic load right after church that morning.

It was also a noteworthy event in the lives of people such as Sy Dietz and Charlie Swartz, Southwestern Bell equipment engineers on the project, who had lived with the job for many long months; or Fred Mareschal, local commercial man-

ager, who spearheaded an exhaustive public information campaign to familiarize people with dialing. It was a gratifying moment to Dave Youngberg, Western Electric Installation Supervisor—the completion of his first No. 5 Crossbar project.

It was the culmination of a long, exacting undertaking for many other Southwestern Bell and Western Electric people—all those who had established the present and future need for the new office, who had determined its type and size and helped it become smoothly integrated in the Bell System and in the lives of the people it serves.

It has special significance here as a study of 10,530 subscriber lines—20,000 telephone people of the Bell System address themselves to; of one of the most extraordinary examples of planning and coordination to be found anywhere—the creation and fabrication of a dial central office with associated toll facilities.

ADAMS 3 AND 4 is a No. 5 Crossbar office of 10,530 subscriber lines—20,000 telephone numbers—plus 33 positions of manual toll switchboard and associated toll terminal equipment. It provides Direct Distance Dialing and Automatic Message Accounting—all the features of the most modern dial equipment. The reason for its coming into being is the classic one of these times: the rapid and steady post-war growth of a community and the corresponding need for more service and a higher quality of service than the old manual office could supply.

Somewhat larger than the average No. 5 office, it was, like so many other current jobs, a dial conversion with associated toll equipment. And it was a “coordinated job.” In other words, it had to interconnect with many different kinds of equipment, both

Bell System facilities and those of connecting companies in surrounding communities. Thus, ADAMS 3 and 4 presents a good cross section of the factors involved in producing central office equipment of all kinds. Typically, too, it was an “E. F. and I.” order, meaning that, as is usually the case on larger jobs, Western Electric would “Engineer, Furnish and Install” it. The fact that it is No. 5 Crossbar, the most advanced type, now becoming increasingly familiar and important, adds to the pertinence of this study.

In mid-September 1953, Western Electric was officially informed that Southwestern Bell, having completed Traffic and Plant studies of the area’s present and future telephone needs, was tentatively planning a new central office for Belleville. It was then that the “A. N. O.”—Advance Notification of Order—dated September 17, reached the hands of E. J. Hanson, service manager of Western Electric’s St. Louis Distributing House. It stated generally the kind of office, the type of equipment needed, and requested a tentative date for shipment of equipment to the job site of February 12, 1955, and an installation completion date of October 22, 1955.

The A. N. O. didn’t come as a surprise. Because of their close association with telephone company people through the St. Louis Distributing House and the Installation Area Headquarters, Western Electric people concerned with such projects were already aware of the job. It is vital for them to get all the information they can as far in advance as possible so that tentative planning can begin. Nevertheless, the A. N. O. was a most important step in the sequence which brings a central office from planning to completion.

While it is purely tentative, and does not commit the telephone company, the

Creation of a Central Office

A. N. O. provides a basis for preliminary planning and scheduling. Information it contains is valuable in the preparation of long range production estimates, for example, and in planning future installation manloads. It influences many other things, such as the purchase of raw materials and especially the contracts signed with outside suppliers for heavy power equipment, for which many months may be required for delivery. It permits actual production—the manufacture of piece parts—to begin before the order is received. It has the net effect, too, of assuring the job a place in the procession of jobs going through Western Electric's shops. For these reasons, schedules set up between Western Electric and the Bell Companies call for the delivery of the A. N. O. within a predetermined interval.

April 22, 1954, is the next significant date having to do with the Belleville job. Following standard procedures, approximately four weeks before the "order due date," the telephone company gave definite notice that it would be forthcoming. At this time, Western Electric sent a prospective schedule to Southwestern Bell listing dates

which complied with those requested on the A. N. O.

BY THE TIME THE Firm Order, dated 5/21/54 and containing outline specifications prepared by Southwestern Bell engineers, reached Western Electric's St. Louis Distributing House, preparations had been made for it. The job went into high gear immediately. The St. Louis service organization analyzed it to be sure all needed information was there, and sent copies to "all interested parties," including the Hawthorne and Kearny Works, principal factories involved, and the St. Louis Installation Area headquarters. It was at this point that the St. Louis House prepared the project sheet and gave the job its Western Electric identity—a number: 20686—which was to become engraved in the memories of a great many people before the job was through.

As soon as Order No. 20686 arrived at Western Electric's factories, many things started happening. Of most immediate importance was its arrival in the hands of Western Electric equipment engineers who would prepare the specifications which

Frequent conferences between Western Electric people and those of the telephone company help to maintain a necessary close liaison.



would guide the manufacturing shops and installers in making and assembling the physical "machine."

This was an undertaking which was to require some thousands of man-hours of engineering time at the hands of 15 equipment engineers at the Hawthorne Works, where the No. 5 Crossbar equipment was produced, and by 14 other engineers at the Kearny Works, source of the associated Toll equipment. This phase of the project required several months and was roughly comparable to engineering the equipment for a skyscraper, perhaps, or one of the more complex "electronic brain" computing devices, which, indeed, dial equipment resembles in many ways.

The complexity inherent in the engineering of a central office arises from the fact that, with very few exceptions, no two central offices are quite alike. Each must be "tailor made"; "created" first on paper, later in physical form to meet the needs of the specific location for which it is intended. Even though each of two No. 5 Crossbar offices, for example, will have certain basic equipment in common, these "standards" have innumerable variations or "options" in the ways in which they can be interconnected with other units. Besides this, each office will have its own special features. All this must be taken into consideration and provided for if the equipment is to fulfill its specific assignments.

It is in this respect that central office equipment differs most radically from conventional mass produced products. It is not—it cannot be, as things are now constituted—turned out in the form of identical "plug in" packages. One reason for this is that central office equipment is not a "machine" which operates independently. It is but a part of a much vaster machine—the total plant of the Bell System. *It must mesh*

with every other type of equipment, new and old. It must provide for the telephone characteristics of each community—its factories, residential areas—even to such details as the number of teen-agers living there. (This latter factor affects the length of time lines are held). Since it represents a very considerable investment, it must be capable of years of service without faltering. It must be rugged while still being an altogether remarkable machine-complex which approaches an ability to "think" and "act" for itself.

Because of this special engineering, plus the staggering complexity of the equipment itself, production of central office equipment takes a long time. As Western Electric people are well aware, the engineering and production intervals for such jobs as the ADams office can seem agonizingly long—especially when, as a program planning expert put it, "Some builder plows up a potato patch and puts in a few hundred houses almost over night and the telephone company has a service problem on its hands."

How, THEN, can such intervals be reduced? That is a problem which Western Electric and other Bell System people have been closely studying since pre-World War II days. It is not a problem for which a dramatic solution is now possible. Yet much has been done and is now being done.

Specifically, there have been and will continue to be improvements in manufacturing techniques—the development of components such as the wire spring relay, for example, (the ADams office was one of the first equipped with these on a large scale) which eliminates time required in relay adjustment and verification.

There is also constant striving for faster, more efficient equipment engineering and

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installation methods which has paid off in many ways. For example, the procedure of turning certain frames in a central office over to the telephone company for their testing in advance of the completion date shaves off days and makes possible an earlier cut-over date.

At present, large scale increases in Western Electric equipment engineering, shop, and installation forces are in progress. Recent additions to manufacturing facilities, including the purchase of a plant at Montgomery, Ill., and the leasing of a plant on Fullerton Avenue in Chicago to be used for dial equipment production, will greatly increase capacity. While these factors may not have a direct effect on individual job intervals, they will get more jobs under way sooner to meet present unprecedented demands.

Of course, the achievement of such increases in capacity takes time. They have to be planned well in advance so that the manufacturing facilities involved can be obtained and installed in time to meet demands. This planning is dependent on advance information from the telephone companies, which is consolidated by A. T. & T. into over-all requirements prior to the "detailing" of individual jobs.

At this writing a special "task force" of Western Electric, Bell Laboratories, and A. T. & T. representatives has met under the auspices of A. T. & T. for the express purpose of studying ways and means of reducing intervals. High hopes are held for the results of this combined effort.

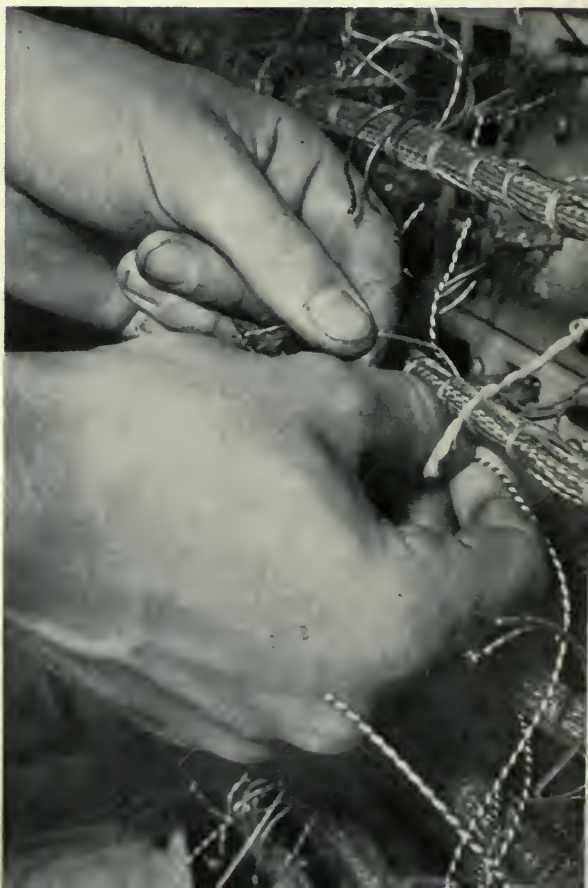
IN THE ENGINEERING of Order No. 20686, the following are a few of the things that had to be considered. It had to be arranged for various classes of service, plus Automatic Message Accounting and toll and tandem switching service.

It had to be arranged for interconnections with the Step-by-Step offices in O'Fallon and Lebanon and with several other types of equipment in eight more Illinois communities. It was the toll center for all these communities as well as for eleven other towns in the area. It also had to interconnect with St. Louis Chestnut and St. Louis Toll and with a 701-A PBX to be installed in Belleville's St. Elizabeth Hospital.

Most of these outlying offices were engineered by Southwestern Bell, but adjustments had to be made in them by W. E. installers and all had to be closely coordinated with the main project by Western Electric.

The part of the job controlled by the Hawthorne Works—primarily the crossbar

Skilled hands direct each wire to its destination and proper contact on the back of the frame.





Left: Equipment engineering at Hawthorne. Right: Forming cable for a frame of crossbar equipment, which may contain many hundreds or even thousands of individual wires.

equipment—required the writing of 45 separate specifications, comprising 2950 individual, circuit, equipment, and job drawings. These specified each of hundreds of units comprising thousands of parts, plus the maze of cables and wires which would interconnect them.

This was only part of the job. The toll equipment assigned to the Kearny Works where this equipment is engineered and manufactured actually comprised two separate jobs: the 33 switchboard positions and the toll terminal equipment, all of which had to be engineered not only to work with the No. 5 Crossbar equipment but with a number of other units as well. Information on which to base the engineering for the toll terminal part of the job was not available until September 16, 1954. These jobs required another 26 specifications and 920 drawings.

Nevertheless, three weeks after engineering started, Hawthorne's first "long-hand spec" covering power equipment had been completed. A few weeks later, the first "shop specs" had been finished and the actual assembly began.

At first, order No. 20686 was without form or apparent identity in the shops. Pooled with other orders of a similar nature, it became a portion of the prodigious cascade of parts and components, of steelwork and wire, which converge on the crossbar and toll equipment shops from other shops at Hawthorne and Kearny, from other Western Electric locations, and from outside suppliers, to feed the insatiable appetites of the assembly lines.

The assembly of the components comprising dial equipment into the big frames which are its basic units, the forming of factory cables (some as thick as a man's arm and containing thousands of individual wires) which interconnect these components, is in itself an impressive undertaking. Some measure of it may be gained from the fact that just one of the 27 line link frames on order No. 20686 plus its supplementary frames required, among other things, 30 crossbar switches, 2 fuse panels, 7 jack panels, 9 terminal strips, 29 mounting plates in turn equipped with 580 relays, 110 resistances, 10 condensers, 10 contact protection networks, 6 terminal strips, 3



Left: Sections of dial equipment flow continuously through the Western Electric shops. Right: Crane operator at Hawthorne Merchandise selects the components of an order for shipment to W. E. installers.

vacuum tubes and 1800 feet of surface wiring. Interconnecting this equipment were 8 local cables comprising approximately 11,000 feet of wire. Others among the job's 286 frames contained even more.

The "tailor made" aspect of jobs such as this is a factor in the shops too. It causes variations in manufacturing processes as well as in the engineering. These require the knowing touch of trained, experienced shop people. Training people to handle "whatever comes along" on the assembly lines in itself poses a problem in these times of expansion of facilities and personnel to meet the heaviest demands for equipment Western Electric has ever had.

Long before the engineering interval was completed, manufacturing, too, was well under way. By late 1954, Order No. 20686 was fast growing from a miscellany of parts into final form. At Kearny, the switchboard and toll equipment was nearing completion. At Hawthorne, tall frames bearing tags on which the words "Belle-ville, Ill.," appeared were approaching the final stages of assembly and testing along

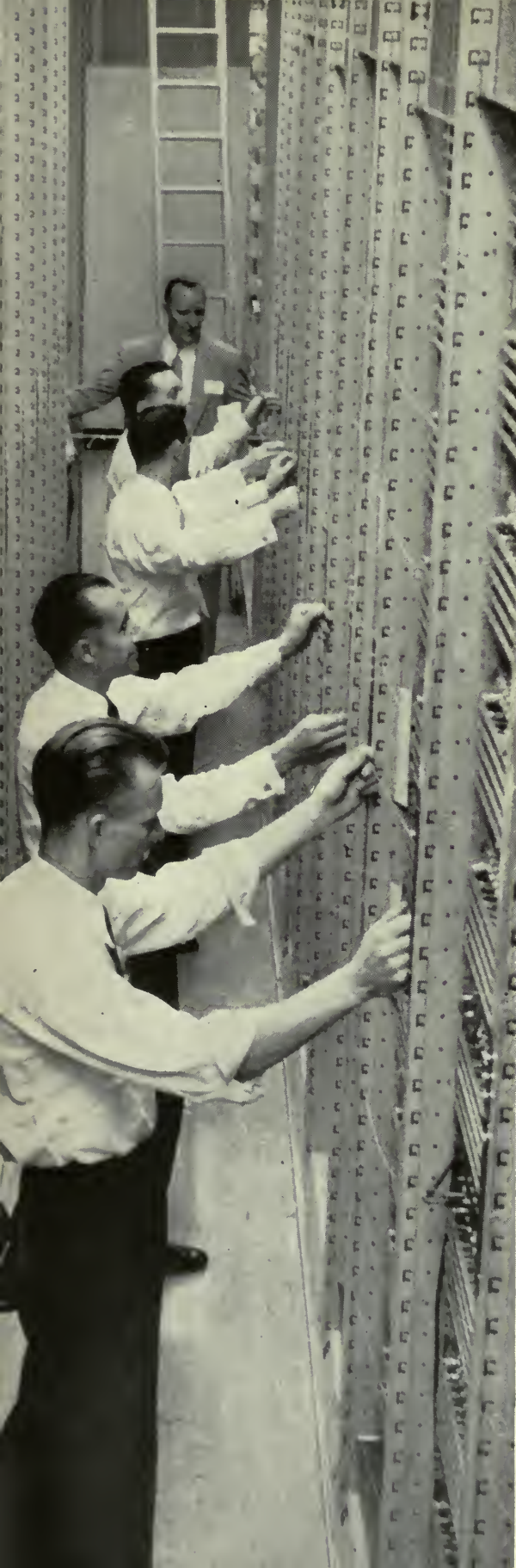
the monorail which carries them through process after process in the Crossbar Shops.

WHILE ENGINEERING AND MANUFACTURING were in progress, a great deal of highly important "paper work" had been completed behind the scenes.

First, back in June, 1954, a study of the data in the Firm Order made it apparent that the completion date could be "improved" from the date requested, October 22, 1955, to September 24.

Second, on September 3, 1954, a series of advance completion dates were set up for iron work, superstructure, lighting, and cabling to begin on January 8, 1955, seven days after the new building was scheduled to be finished and ending on February 5. This advance work was related to the installation of the main distributing frame to be completed in advance to permit Southwestern Bell plant men to terminate cables in the new building.

The telephone company also needed Toll test board equipment ahead of time for "test board to test board" tests. Needed,



too, were two manual positions for operator training.

This meant that about 40 per cent of this part of the job had to be *completed* nine weeks ahead of time; 30 per cent six weeks ahead of time, and the rest three or four weeks in advance. Besides this, there was a lengthy list of advance completion dates to be set up for the coördinated jobs.

Shortly after the project got under way, a very important thing indeed happened as far as the Western Electric people responsible for the job were concerned. The Initial Firm Schedule—the “Brown Sheet”—was issued. Before this was done, each organization involved started at the “hind end” of the job and figured backwards to be sure they could handle their particular phase of the job in the time allotted.

When everyone was satisfied all intervals could be met, Hawthorne Scheduling prepared the sheaf of yellow paper which is the Brown Sheet. It stated flatly that order No. 20686 would be shipped on February 5, 1955, and that Western Electric installers would start work February 21, 1955—allowing for an in-transit interval. Finally, it gave the completion date of September 24, 1955. The issuance of the Brown Sheet committed Western Electric to those dates. They became, in the words of one Distributing House man, “something that’s pretty sacred around here.” From then onward, the Brown Sheet was law; there was nothing tentative about the job any more.

As the shipping date neared, there was another situation to be handled. The equipment for Belleville would comprise some 18 carloads—222 tons—of assorted items. Most

Climax: Preparing to pull the blocking tools, to bring the new dial equipment to instant, vibrant life.

of it would come from Hawthorne and Kearny, but not all. The Point Breeze Works in Baltimore was supplying terminal strips; wired units were coming from the Lincoln Shops; the Allentown plant was supplying electron tubes and resistors; and the Indianapolis Works, fuses and protectors, operators' headsets, and other telephones. Besides this, there were numerous shipments to be made by outside suppliers and a number of stock items (there is a consistent demand for many of these and they can thus be stockpiled) to be selected and shipped from among 22,000 such items kept on hand by Hawthorne merchandise.

The shipment of all these things had to be coordinated, and allowances made for different transit intervals from the various points. They had to be shipped in the sequence in which the installers needed them for the main job and for the coordinated jobs too, and arrivals timed to keep the job running without "flooding the floor" with too much at once. Setting up such a shipping sequence was, as usual, an undertaking which called for close cooperation between many Western Electric organizations, including Field Service, whose function is to be sure the installers get everything they need when they need it.

Field Service men live with looming completion dates, and make sure everyone else does too. Something broken or lost in shipment? Something that isn't as it should be? It is up to the Field Service men to see that such things are fixed, or replaced right away. As Jack Kole, Hawthorne Field Service man on the Belleville job, summed it up, "We go around with the Brown Sheet in our hands and we don't take *no* from anyone."

Of concern to Field Service, as they are to the Distributing House, Installation, and other Western Electric organizations, are

the coordinated jobs, shipments and installation of which must be completed on schedule. "These little side jobs are a nightmare," Field Service men say. "You are always worrying that one of them will be overlooked somehow and hold up a two or three million dollar project."

Installation of the ADams 3 and 4 central office was, in the words of the men who did it, "just another job." It was "another job" requiring, among other things, the making of 750,000 wired connections, each one of which had to be perfect. It included such "details" as the moving of "C" Carrier Terminals from the old office to the new without interrupting service. It was a project in which work had to be done in many of those connecting offices and a variety of complete dates met: May 14 in the St. Louis Chestnut office, July 30 at Mascoutah and Columbia, August 13 at Freeburg, September 9 at Lebanon, to name just a few.

All in all, it was a project on which 114 Western Electric installers worked to transform those tons of inert equipment into a vast, smooth-functioning complex of machinery, tested and verified again and again to make sure it was just that.

FOR ALL ITS COMPLEXITY, for all its local importance, the ADams office is but a small fraction of the 2,500,000-plus lines of dial equipment and the 2300-odd manual positions Western Electric shipped during 1955. It was one of four similar No. 5 Crossbar jobs handled through the St. Louis Distributing House during this same period. One of about 1100 jobs big and small serviced by just this one of the 29 Western Electric Distributing Houses in a given month. It would represent an even smaller proportion of the 3,100,000 dial lines and 3420 manual positions scheduled to be shipped in 1956.

Installation work on the ADams 3 and 4 central office was finished on September 17, a week ahead of the scheduled completion date. There followed a period of testing by Southwestern Bell. On September 28, a request for a few minor parts—

eight additional 15-A indicators—came to the St. Louis Distributing House at 3:45 p.m., and they were shipped from stock immediately. "That's the last we heard from them," they say. "We believe we gave the customer what he wanted."



In a new dial office: Testing and verifying the equipment before turning it over to the telephone company.

HEADQUARTERS SUMMARY

Sept. 15 to
Dec. 15, 1955

SINGLE-CHANNEL OPERATION (Dial "Operator" only) is more desirable from the customer's standpoint than dual-channel operation, where two different codes (*e.g.*, either 0 or 110 or 211) are used to reach an operator. Two codes are used where some long distance calls (*e.g.*, short haul station-to-station calls) are handled by operators at the local office DSA switchboard and others at a separate toll office.

Recently the Companies reported on the present status of single- and dual-channel operation. About half of the total main stations in the System are served on a single-channel basis. The remaining stations are mostly in the larger cities, served by only about 100 of the total of some 2,000 toll centers. The companies' replies were in general agreement that single-channel operation is a sound long range objective.

A GROUP of experienced Commercial men and women from line and staff organizations in a number of Companies has been formed to undertake a review of the business office service representatives' job. While the service representative form of organization has proven to be efficient and practical, there have been many changes in operation since it was introduced in business offices in the early 1930's. It therefore seems timely to see if there is anything basic or fundamental that can be done to promote further job effectiveness.

The group, working in teams of two or three, will visit many of the Companies to review and discuss in the business offices the current work and assignments of service representatives. Various sizes and types of offices will be included in these schedules.

THE BUILDING construction art has advanced to the point where developers of large housing projects can now build homes and have them ready for occupancy in approximately three months. With the current shipping interval of 13 weeks for telephone feeder cables, however, it is difficult in many instances for the Companies to provide the facilities needed to furnish telephone service by the time the homes are occupied.

As an aid to correcting such situations, representatives of Western Electric and O. & E. have developed a plan whereby Western's

present 13-week shipping interval on non-stock-size cables will be reduced by more than one-half for limited quantities, effective with cable shipments in April 1956.

As an important part of this plan, requirements will be furnished Western on a month-to-month basis for the fourth month ahead instead of quarterly for a six-month period, as has been the custom.

This reduction in ordering interval for an adequate part of the regular cable program, plus procedures already available for reducing engineering and construction intervals, is expected to go a long way in helping to meet promptly the demands for service in those cases where unforeseen requirements make special handling necessary.

A GREATER PROPORTION of A. T. & T. share owners subscribed to the latest offering of A. T. & T. convertibles, the 3 $\frac{3}{8}$ s of 1967, than in any of the Company's previous convertible offerings. Of the \$637,165,800 offered, only \$3,518,000 was left unsubscribed, or about one-half of one per cent. This compares with \$6,140,900, or about 1%, unsubscribed in the 1953 convertible offer. The unsubscribed debentures were later sold in the market at a price of 130%.

Although the new debentures were not convertible before December 13th, nearly half had been converted by the end of the year. This large volume of conversions was due in part to the popularity of the "hold for conversion" privilege which was made available for the second time. Over 295,000 subscribers availed themselves of this privilege, providing about \$168 million in debentures to swell the total of early conversions.

These heavy conversions on the new issue, together with conversions of previous issues and a substantial amount of equity capital coming from issuance of shares to employees, had the effect of bringing the Bell System debt ratio down from 37% at December 31, 1954 to about 35% at the end of 1955, in line with the System's long-term objective of 1/3 debt.

NEW AUTOMATIC switching equipment placed in service in Harrisburg, Pa., and Jacksonville, Fla., early in December enables long distance telephone operators in those cities to dial di-

rect to telephones in more than 4,000 cities and towns. The new mechanisms also automatically switch calls that are routed through those cities.

These installations of so-called No. 4 type switching apparatus bring to 39 the number of such systems in operation. Almost 60 per cent of all long distance calls in the United States is now handled by operator dialing. Similar facilities are now being installed for cut-over this year at Buffalo, N. Y., Columbus, O., Memphis and Nashville, Tenn., and Montreal, Canada.

A NEW semi-automatic teletypewriter relay system, the first of its kind, has been placed in service jointly by Long Lines and the Pacific Company for Consolidated Freightways, largest motor transport carrier in the West. Its purpose is to expedite messages dealing with the dispatch of Consolidated's 2,000 trucks, trailers, and other vehicles in 12 states.

A relay center at the company's headquarters in Portland, Ore., is the heart of the system. Terminated in the center are 11 circuits stretching 13,000 miles and serving 70 locations in 65 cities.

At an outlying station a message in perforated tape is placed in the transmitter. At the relay center, equipment which automatically searches for incoming messages causes the transmitter at the distant point to operate. When the message is received in tape form at the center, an attendant places it in a transmitter connected to the called station and sends it on its way by pressing the proper button. The center can also take care of "broadcast" messages. A message can be directed by push buttons to several stations on one circuit or on several circuits—or to all 70 stations simultaneously.

This is one of ten semi-automatic teletypewriter relay systems sold to date.

THE JUNCTION TRANSISTOR has made possible an entirely new approach to the design of a telephone set for the hard of hearing. Capable of operating as a high efficiency amplifier at low voltages, the junction transistor uses but a small fraction of the central office power supplied to the instrument at a customer's premises. Now for the first time it is possible to operate a practical receiving amplifier in a telephone set without the use of local batteries.

A NEW MICROWAVE ANTENNA has been developed to improve the efficiency of the Bell

System's long-haul microwave radio relay systems. This antenna can operate simultaneously in the 4,000-, 6,000-, and 11,000-mc bands designated by the FCC for "common carrier" use. This antenna has already been incorporated in some recent TD-2 installations.

BULKY PRE-World War II capacitors were miniaturized first by depositing metal on thin strips of lacquered paper. Now, by a process invented at Bell Telephone Laboratories, the paper can be removed to leave only a thin film of metallized lacquer. Besides their great conservation of space, these capacitors are particularly applicable to low-voltage circuits using transistors.

UNTIL ABOUT two years ago, the use of photoelectric cells in the Bell System was largely a single application in the transmission of wire-photo pictures. However, the recent successful employment of phototransistors in the card translator unit of the nation-wide direct distance dialing network is regarded by many as the portent of more widespread general use of semiconductor photocells in communication. The latest unit of this type, the 1N85 p-n junction phototransistor, appears to be one of the most likely candidates for introduction in such new applications.

WESTERN ELECTRIC plans to move ahead with an engineering development program looking toward the substitution of aluminum for copper in the manufacture of telephone cable.

Decision to undertake this program was influenced by mounting concern over sharply rising copper prices, the disruption in production schedules which repeated copper shortages have caused, and the success of recent experiments with the use of aluminum wire. Processes being explored for quantity production involve converting facilities now used for drawing copper wire. Extent of such conversion would be dictated by future over-all economic and supply considerations. The program also includes development of means to prevent corrosion of pulp insulated aluminum conductors.

For equivalent transmission, aluminum conductors 2 gauges larger than copper are required; for example, 22 gauge aluminum versus 24 gauge copper. For underground work, this means that maximum size aluminum cable would have fewer pairs than maximum size equivalent copper cable: e.g., 909 pair 22 gauge cable versus 1,515 pair 24 gauge cable.

The Blue Pencil



HERE ENDETH VOL. XXXIV of this avowed medium of suggestion and record of progress. One hundred and thirty-four issues have rolled from the presses, beginning with that of April, 1922. It isn't 136, as a quarterly publication would imply, simply because VOL. I had only three issues and production pressure eliminated one issue during the war.

On what note shall the volume end, then? How about recognizing the increased acceptance and use of all forms of electrical communication? A pertinent reference might be to the gentleman at Weston-super-Mare, in England, who telephoned to request a reproduction of last Autumn's cover, as offered in this department then. Such time-saving method got immediate action, and a copy of the hurricane-warning scene was despatched to him the same day.

Those facts are as here stated. They ought perhaps to be amplified a bit, however, to explain that the caller didn't use commercial overseas telephone service. The gentleman is an amateur radio telephone "ham" of long practice, and for years he has conversed regularly with a colleague on this side of the water who happens to be a member of the A. T. & T. organization. When the Britisher expressed to him one morning last fall a wish to have a copy of the print of the red-and-black flags betokening hurricane, the U. S. half of the team of talkers passed along the request to the editor of the MAGAZINE—with the result already recounted.

This fuller version isn't so spectacular as the incident may have seemed at first. It is pleasant to know, even so, that the small type of these back pages really is read; and any editor would get a bang out of the knowledge that his cover design stimulated admiration in a foreign land.

Reproductions of that cover were made available to our readers, actually, with the idea that the painting might have some special significance to people who had had personal experience with the hurricanes and floods which beleaguered the north-eastern section of the country last Summer and Autumn. Where would you guess most of the requests came from? Texas and California! Don't ask us why.

Last Autumn's and this Winter's cover paintings, both done for us by Charles Mazoujian, testify to that gentleman's versatility, since they seem to possess in common chiefly the qualities of interesting concept and finished execution.

RESPONSES VARY to the minor essays which are expounded in these pages. Our tale of the outdoor telephone booth named Miranda, narrated here last Autumn, brought just some comment from a few of her more distant relatives, and an invitation to join the Marine Historical Association at Mystic, Connecticut.

Our specific request for news of readers' favorite telephone booths elicited a reminder, however, of the yarn about the booth in a hotel which appeared some years ago in Frank Case's book about the Algonquin Hotel in New York: "Tales of a Wayward Inn," published by Frederick A. Stokes Co. Do you recall it?—

"The hotel had no elevator. Guests had to climb the stairs to their rooms, and the staff was always happy to see an inebriated stranger arrive. When he asked where the elevator was, we gravely directed him to the telephone booth. This was a huge contraption at the end of the office that might be mistaken for an elevator car if you didn't look too closely. I have seen a man sit in the telephone booth for twenty minutes, sticking his head out of the booth to holler frantically, 'Where's the elevator boy?' We always replied, in modulated tones, 'He'll be there directly, sir.'"

TEN YEARS AGO, the name of Sir Robert Watson-Watt was on every—well, almost every—tongue. He was the inventor—as much as it can be credited to any one man—of radar. And we all know that radar was what saved Britain from extinction by Hitler's bombers, and plays an incredible role today in the world's determination to remain free. Perhaps that is too much introduction to the rather minor fact that Sir Robert was arrested and fined in Canada some months ago for speeding. We wouldn't think of mentioning it if it were not that he was caught through a radar speed detector. We still wouldn't mention it, for fear of international repercussions, if it were not that we

lifted the item from the *British Post Office Magazine*.

THE WIDE OPPORTUNITY—not to say necessity—for an editor's reading we have had occasion to comment on before now. Interesting material is where you find it: almost anywhere. Most recently it has been in the *Atlantic Monthly*, which quotes a couple of chapters from a book written by John Masters and about to be published by Viking Press, called "Bugles and a Tiger: Adventures on India's Frontier." One part which struck a reminiscent note was the author's account of how as a very new and entirely untried subaltern he was suddenly given for a week the sole command of and responsibility for two whole Gurkha companies. Overwhelmed at the magnitude of the assignment, he sought the advice of a slightly senior and more experienced fellow officer. The latter recommended that the new subaltern leave most matters to the Gurkha officers and clerks, and come to him for guidance if really necessary. It was his final suggestion that the novice would find it helpful if he "always walked about at a pace slightly faster than normal, carrying a bunch of papers, and working my lips as though thinking out loud. It was good advice, and still is, and not only in the army."

We are happy to feel that we may have stumbled on the origin of a time-honored custom.

ARE WE TOO CONSCIOUS of the constant presence of the "Genius of Electricity"—the Spirit of Communication, the Golden Boy—who

stands a-tiptoe overhead, swathed in cables and gold leaf, on top of A. T. & T. Headquarters at 195 Broadway in New York? Certainly we have mentioned him several times in recent issues. As a general symbol of the Bell System, he is a handy focus for employee interest. And yet he need not be taken too seriously. There are lots of jokes about him—of both kinds—and we think the one drawn on this page gives a nice little fillip to the standard representations of him.

He first appeared thus in one of the publications of the Western Electric Company. When we called up the editor, to ask permission to reproduce the idea, he said "Why don't you just do what I did?" When we asked for particulars, he said succinctly: "Swipe it." So to some originator of a happy thought, our thanks.

A SHORT COURSE in relativity may be had as a concomitant to this business of editing. We spoke, a few paragraphs above, of the conclusion of 34 volumes of publication. But VOL. XXXV No. 1 is already in preparation and our sights are straining ahead to other subsequent issues. These words are being written five days before Christmas—one of the last chores before the deadline—but already it is too late to address to our gentle readers the compliments appropriate to that occasion. New Year's will have passed ere these words are read in print. But since that day lies still further ahead as they are indited, perhaps it is permissible to set down here the greeting which we hope will continue in effect for all the days, weeks, months, and *quarters* which will come to pass in 1956: HAPPY NEW YEAR.



"It's the man from the telephone company."



John M. Shaw

Whos' Who & What's What

(Continued from page 215)

which are involved—thanks to him. Mr. Cook became a telephone man in 1929, when he started as a traffic student with the New Jersey Bell Telephone Company, and in the next dozen years held various posts in that department. From 1941 to 1944 he was an engineer in the traffic division of the Department of Operation and Engineering at A. T. & T. Then he went out to the Pacific Telephone and Telegraph Company as traffic results engineer, but the following year he changed to the Public Relations Department there, as assistant vice president. The Northwestern Bell Telephone Company called him to be its Vice President of Public Relations in 1947; he was Vice President and General Manager of its Nebraska-South Dakota Area from 1949 to 1951; and Operating Vice

President of the company 1951-53. He returned to A. T. & T. in 1954, where his title is Vice President, Administration-R. And R stands for Revenues.

BORN IN SCOTLAND, JOHN M. SHAW came to this country as a boy, and was employed both in retail business and in several public utilities before joining the then Information Department of A. T. & T. in 1930. He subsequently served the Chesapeake and Potomac Telephone Company as information manager and the New York Telephone Company as an assistant vice president in the Public Relations Department before returning to A. T. & T. in 1944. From that year until the Spring of 1955, Mr. Shaw, as assistant vice president in the latter company's Public Relations Department, had charge of radio, motion picture, open house, and public lecture and exhibit activities. Last year he joined the newly



Ralph E. Mooney



George B. Turrell Jr.

created Merchandising Department as assistant vice president. Of his several contributions to this MAGAZINE during the past quarter century, his most recent, in the issue for Winter 1954-55, was "People as Telephone Users, Workers, and Investors."

EARLY "DOINGS" among the "founding fathers" of this business are one of the particular interests of RALPH E. MOONEY, who since 1945 has been historical librarian of the A. T. & T. Company. His telephone

career began in 1924, after some years of newspaper and trade journal experience, when he joined the Public Relations Department of the Southwestern Bell Telephone Company in St. Louis. Before transferring to New York in 1944 he had been editor of the *Southwestern Telephone News*, and in recent years he has been a frequent contributor to this MAGAZINE. His most recently published article was "Thomas D. Lockwood: An Early Builder," in the issue for Winter 1954-55.

BEFORE JOINING the Public Relations organization of the Western Electric Company in 1942, GEORGE B. TURRELL Jr. had been managing editor of a "class" magazine of nation-wide prominence. After time out for the Army, he returned to Western, where he prepared material describing that company's strenuous efforts to return to a peace-time economy and perform its urgent tasks of assisting the Bell System to meet ever-mounting demands for telephone service. For the past five years Mr. Turrell has been feature editor of WE Magazine. He is able to write so authoritatively about ADams 3 and 4 because he followed its—or their—progress in person from the first gleam in the eyes of Southwestern Bell engineers until tests were completed and the equipment was handed over to those who would be responsible for it thereafter.





The Spirit of Service that keeps on growing

There is a heritage of service that is passed on from one generation of telephone people to another.

It had its beginning far back in 1875 when Alexander Graham Bell gave the world its first telephone. It has grown as the business has grown.

Many times each day and night this spirit of service is expressed in some friendly, helpful act for someone in need. The courtesy, loyalty and teamwork that telephone people put into their daily jobs are a part of it. Out of it have come the courage and inspiration that have surmounted fire and

flood and storm.

We, the telephone people of today, are vested with the responsibility of carrying on this trust. It is human to make mistakes and so at times the job we do for you may not be all that we want it to be. But in the long run, we know that how we do our individual job and how we bear our individual responsibility, will determine how we fulfill our trust.

For our business is above all a business of people . . . of men and women who live and work and serve in countless communities throughout the land.

BELL TELEPHONE SYSTEM



